

# ***STP Quarterly Review***

**25 Oct 2011**

**4QFY11**



**William Denig**

**Solar & Terrestrial Physics Division**

**NOAA/NESDIS/NGDC**

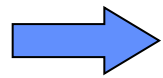
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# **OUTLINE**

## **Solar & Terrestrial Physics Division**



### **STP Program Overview**

### **Milestones & Performance Measures**

### **Personnel Activities**

### **Accomplishments & Updates**

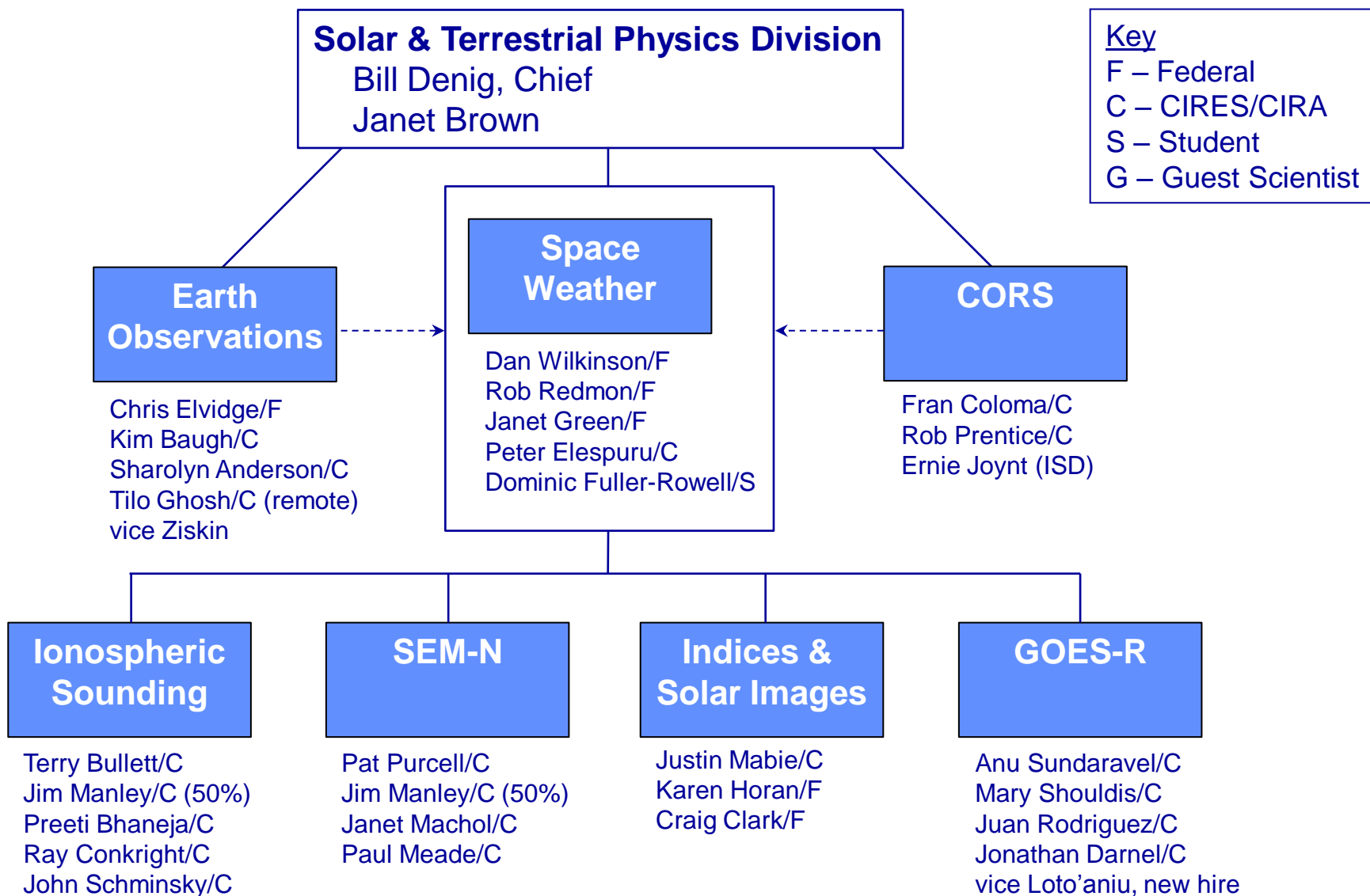
### **Special Interest Items**

### **Greg Mandt Visit**

### **Issues & Summary**



# Solar & Terrestrial Physics Division Personnel





# STP Division Overview

## Personnel Changes



- **Gains**
  - Mary Shouldis, GOES-R
  - Juan Rodriguez, GOES-R Particle Physicist
  - Jonathan Darnel, GOES-R Solar Physicist
- **Losses**
  - Lisa Risso, Summer Intern
  - John Schminsky, Full-time employment, Denver
- **Reassignments**
  - Pat Alken, transition to MGG
- **Inbound**
  - None
- **Vacancies**
  - GOES-R Magnetometer Physicist – Interviewing now
  - NightTime Lights Scientist – Just starting the process
- **Outbound**
  - None



# STP Division Overview

## Agreements – Status



Agreements											
Scope	Team	Type	Partner	NOAA Legal	DOC Legal	NGDC Signed	Partner Signed	Start	End	Status	
CORS Support	NTL	AGR	NGS	n/a	n/a			01-Oct-03	30-Sep-12	G	Extension now in place
SWx Climatology	NTL	MOU	AFCCC	X	X	X	X	27-May-04	01-Oct-14	G	In place - no FY11 activity
GPS Data (CORS)	NTL	MOA	Multi	n/a	n/a	X	X	20-Sep-04	TBD	Y	Biannual Review - at NGS
Outage Detection	NTL	MOU	NPS	-				02-Aug-11	01-Aug-14	G	New MOU - Resubmitted to Legal
NASIC	NTL	MOU	NASIC	X	X	X	X	09-Mar-11	30-Jan-15	G	In place - nothing to report
Ionospheric Data	SWX	MOU	AFWA	X	X	X	X	21-Aug-06	21-Aug-11	G	Expired - No need to renew
DMSP Archive	NTL	MOA	DMSP	X	X	X	X	30-May-07	30-Sep-09	Y	Expired - Reconsidering need?
ViRBO	SWX	MOA	NASA	X	X	X	X	15-Apr-09	n/a	G	In place - no FY11 activity
Ionosonde Sites	SWX	IA	USGS	X	X	X	X	03-Apr-09	03-Apr-14	G	In place - no FY11 activity
SEM-N - AFRL	SWX	MOA	AFRL	X	X	X	X	11-May-09	11-May-14	G	In place - nothing to report
Nighttime Lights	SWX	MOU	DOE	X	X	X	X	12-Aug-09	12-Aug-13	G	In place - nothing to report
Gas Flaring	NTL	SA	WBank					TBD	TBD	G	Need to re-submit - just starting
SEM-N Algorithms	SEG	MOU	SMC	X	X	X		01-Aug-11	31-Jul-13	G	New MOU - now in place
											10/24/2011
										G	Good shape
										Y	Watch Item
										R	Action Required



# STP Division Overview

## FY12 Funding [TBD]



STP Balance Sheet - FY12 [TBD]									
	Income			Expenditures					
	FY11 Carryover	FY12 New	Sum	Salaries	Travel	Miscellaneous	OD overhead	Sum	Notes:
Base				618,293				618,293	
NGDC Base	0	1,389,956	1,389,956						Use FY11 base allotment for FY12 - see Connie Craig (24 Jun 11)
Space Weather				1,171,493		19,481	2,500	1,193,474	
POES Processing	85,000	25,000	110,000			19,481	2,500		\$19,481 to ISD for K Tanaka (FY11)
Nighttime Lights				353,710	4,800		54,800	413,310	
NPS (DHS)		198,000	198,000		4,800		19,800		
NASIC		100,000	100,000				10,000		
NASA - ASU	25,000	25,000	50,000				2,500		
NASA - Ames		25,000	25,000				2,500		
JPSS Cal Val		53,000	53,000				5,300		
World Bank		45,000	45,000				4,500		
Data Sales		30,000	30,000				3,000		
McMurdo	20,000	72,000	92,000				7,200		
Ionospheric Data Serv				0				0	
Northrop-Grumman		0	0	0					Terry Bullett - self-supporting
GOES-RRR				829,302	101,669	227,256	120,977	1,279,204	
GOES-R (1)		362,000	362,000		68,669		36,200		PN 76 - \$72,000 for fed oversight included in GOES-R (3)
GOES-R (2)		544,400	544,400		32,000	227,256	54,440		PN 77 - \$109,080 for fed oversight included in GOES-R (3)
GOES-R (3)		182,080	182,080		1,000		18,208		Overhead & federal oversight (FY12)
GOES-R (4)		121,292	121,292				12,129		GOES-R L1 Cal/Val
CORS				95,346	10,000	78,000	15,840	199,186	
CORS		198,000	198,000		10,000	78,000	15,840		OVHD is 8% of total
SEM-N				374,134	30,000	103,190	60,231	567,555	
SEM-N (1)	237,000	442,313	679,313		20,000	93,190	44,231		Proposed FY12 funding assuming Bogart (minimum) funding
SEM-N (2)	160,000		160,000		10,000	10,000	16,000		Federal oversight - received in late FY11
CLASS				152,023				152,023	
CORS		152,000	152,000						OVHD is 8% of total
			4,492,041					4,423,045	As of 24 Oct 11



# STP Division Overview

## GOES Spacecraft/Instrument Status



Spacecraft	Series	Operational Status	Status	Magnet1	Magnet2	Magnetometer 1	Magnetometer 2	MAG	XRS	XRS-EUV	EXIS	EPS	HEPAD	SEISS	XRP	SXI	SUVI
GOES 8	GOES I-M	Decommisioned	R	G	G				G			G	G		G		
GOES 9	GOES I-M	Decommisioned	R	G	G				G			G	G		G		
GOES 10	GOES I-M	Decommisioned	R	G	G				G			Y	G		G		
GOES 11	GOES I-M	Operational West	G	G	G				R			G	G		R		
GOES 12	GOES I-M	South America	G	G	G				R			Y	G		R	R	
GOES 13	GOES N-O-P	Operational East	G			G	G			Y		G	G			Y	
GOES 14	GOES N-O-P	On-orbit Storage	G			G	G			G		G	G			G	
GOES 15	GOES N-O-P	Standby	G			G	G			G		Y	G			G	
GOES R	GOES R	Acquisition						TBD			TBD			TBD			TBD
GOES S	GOES R	Acquisition						TBD			TBD			TBD			TBD

As of: 17 Oct 11

Operational (or capable of)	G
Operational with limitations (or Standby)	Y
Operational with Degraded Performance	O
Not Operational	R
Status Unknown	TBD

*Note: SWPC operations use GOES-15 SEM & SXI. GOES-13 SEM (no XRS) & SXI (sometimes) are also used for SWPC operations. All available GOES and POES Space Weather data flowing into the archive.*





# Information

## STP Annual Data Ingest<sup>1</sup> – 4QFY11



	<b>CY10 GB</b>	<b>CY11-YTD GB</b>	<b>CY12 TBD</b>
<b>GOES SEM</b>	71	55	-
<b>GOES SXI</b>	870	1,400	-
<b>POES SEM</b>	14	11	-
<b>DMSP OLS</b>	5,000	3,800	-
<b>CORS GPS</b>	19,700	15,900	-
<b>Ionosonde</b>	1,400	722	-

<sup>1</sup>Uncompressed data volumes

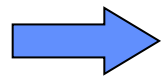


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### **Personnel Activities**

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# FY11 Milestones STP



LO	Goal	Objective	Milestone			Due	Completed	POC
NOS	Resilient Coastal Communities and Economies (NOS)	Safe, Efficient and Environmentally Sound Marine Transportation	Acquire available definitive geomagnetic data from the INTERMAGNET consortium for 2009 including data from over 100 magnetic observatories	C		4QFY11 30-Sep-2011	4QFY11 30-Sep-2011	Mabie
CS	Climate Adaptation and Mitigation (CS)	Improved Scientific Understanding of the Changing Climate System and Its Impacts	Prepare and submit a white paper to the National Research Council on the need for continuous satellite measurements to maintain the Total Solar Irradiance (TSI) Climate Data Record (CDR)	C		1QFY11 30-Dec-2010	1QFY11 12-Nov-2010	Denig
			Calculate national and global gas flaring volumes for 2010 using available imagery data from the Defense Meteorological Satellite Program (DMSP)	C		2QFY11 31-Mar-2011	2QFY11 23-Feb-2011	Elvidge
			Complete and release the year 2010 radiance calibrated nighttime lights product	C		3QFY11 30-Jun-2011	3QFY11 30-Jun-2011	Elvidge
NWS	Weather-Ready Nation (NWS)	A More Productive and Efficient Economy Through Environmental Information Relevant to Key Sectors of the U.S. Economy	Complete the historical data rescue of solar synoptic drawings for years 1972 to 2009 prepared by the NOAA Space Weather Prediction Center and predecessor organizations.	C		1QFY11 30-Dec-2010	1QFY11 01-Nov-2010	Horan
			Deliver to the NWS Space Weather Prediction Center a transition ready version of the Ovation Prime aurora product	C	AOP	1QFY11 30-Dec-2010	1QFY11 10-Dec-2010	Redmon
			Produce a Concept of Operations for the archive, access and assessment of the GOES N-O-P Space Environment Monitor (SEM) data from the NESDIS OSDPD	Y		2QFY11 31-Mar-2011	CR/No Budget Request to cancel	Wilkinson
			Develop and deliver a science-grade software product to compute ionospheric electric fields for the Swarm satellite constellation mission	C		2QFY11 31-Mar-2011	2QFY11 04-Mar-2011	Alken
			Develop a master plan for the NGDC solar program identifying all current organizational interfaces tied to the NMMR metadata repository	C		3QFY11 30-Jun-2011	3QFY11 30-Jun-2011	Denig
			Release new Auroral Resources page facilitating visualization of and access to space weather datasets available through NGDC	C		3QFY11 30-Jun-2011	3QFY11 30-Jun-2011	Redmon
			Deliver to the Defense Weather Satellite System (DWSS) Program Office updated Algorithm Theoretical Basis Documents for the Space Environment Monitor - Next (SEM-N) sensor	C		4QFY11 30-Sep-2011	4QFY11 29-Sep-2011	Purcell
			Digitize and make available on-line the complete set of Solar-Geophysical Data reports for 1955 to 2009 prepared by the NGDC Solar Data Services group	C	AOP	4QFY11 30-Sep-2011	3QFY11 22-Apr-2011	Clark

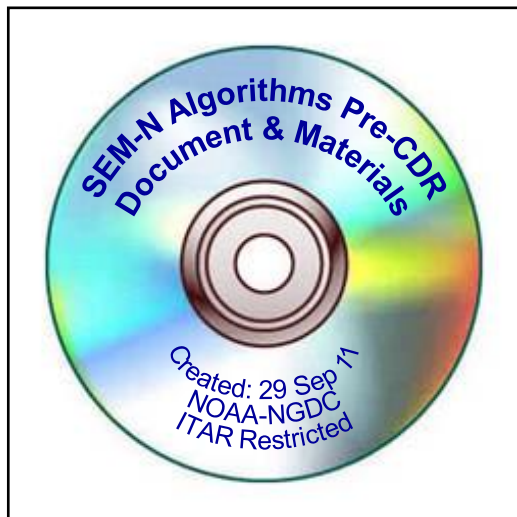
As of 24 Oct 11

**C** Complete  
**G** On-track

**Y** Watch Item  
**R** Issue



# AOP Milestone SEM-N Delivery



**Milestone:** Deliver to the Defense Weather Satellite System (DWSS) Program Office updated Algorithm Theoretical Basis Documents for the Space Environment Monitor - Next (SEM-N) sensor.

- **Planned Completion:** 4QFY11 (30 Sep 11)
- **Actual Completion:** 4QFY11 (29 Sep 11)

**Program Status:** The USAF is undergoing an “efficiency” study to determine the way ahead for the DWSS. Continuity of the program at this point is uncertain.

## ***NOAA Impacts to the cancelation of the DWSS SEM-N***

The Space Environment Monitor – Next (SEM-N) provides in-situ measurements of energetic charged particle radiation within the low earth orbit (LEO) space environment. The 22 Jun 2010 Memorandum from the Under Secretary of the Air Force for Acquisition, Technology and Logistics (attached) directed that the SEM-N was to be included on the Defense Weather Satellite System (DWSS). The [Senate Appropriation Committee's](#) recent recommended cancelation of the DWSS could, if implemented, have an immediate negative impact on the development of the Space Environment Monitor – Next (SEM-N) and on the Nation's ability to specify the near-earth space environment. While the Committee's further recommendation was to provide funding for “continued common sensor development, as well as requirements definition and source selection activities for a full and open competition for a follow-on program” it is unclear how this further recommendation might impact SEM-N. This note considers the impact to NOAA and NOAA constituents in the event that SEM-N is not included on DWSS.

Dr. Kathryn Sullivan's recent [testimony](#) to Congress noted that “the Space Environment Monitor, expected to fly on the DoD DWSS satellite, is critical to meet the operational needs of the NOAA Space Weather Prediction Center” (SWPC). Also from a NOAA perspective, it should be noted that the prior descoping of the SEM-N from the Joint Polar Satellite System (JPSS) was predicated on the availability of SEM-N data from DWSS (reference JPSS L1RD, attached). The DWSS/SEM-N is the follow-on sensor to the current POES/SEM. A recent informal *POES SEM User Study* conducted by the SWPC (attached) notes that there is broad interest in the current POES products by users representing industry, government, and research. By way of metrics this study documented that on a single day in late 2008 (solar minimum) POES data were used by about 500 distinct companies, 145 U.S. universities and colleges, 39 state and federal entities and 90 countries. With regard to specific product usage, on a typical day the POES auroral activity map is retrieved almost 200,000 times representing approximately 13% of all SWPC traffic. In 2009 nearly 7 terabytes of archived POES SEM data were transferred from the National Geophysical Data Center (NGDC) to individual users.

A recently completed National Space Weather Program analysis of space weather observing capabilities noted that the DWSS SEM-N is the only domestic source for operational, space particle data in LEO after POES and DMSP. Loss of SEM-N data would substantially degrade National capabilities to observe the size and intensity of the polar aurora which affects global high-frequency radio communications, high-latitude GPS and satellite communications. This would have a deleterious impact on trans-polar air traffic efficiency and safety and on other operations at high latitudes. Degradation of an auroral zone specification would also have a significant negative impact on space radar tracking over the northern polar region and for specifying atmospheric drag effects on satellites and space debris. Post-event analyses of satellite anomalies resulting from the environment would also be adversely impacted by the non-availability of space radiation data.

It should be noted that the SEM-N provides a space weather specification but has limited capabilities for prediction. The SWPC and the NGDC are looking into technologies that might provide a predictive capability for the LEO space environment. However, these potential capabilities do not negate the need for in-situ measurements used to both validate environmental predictions and to improve the fidelity of environmental specifications for space situational awareness. To that end, SWPC and NGDC are re-aligning various POES data and product services to address the continued needs of NOAA constituents for near real time and retrospective data from POES/SEM and the follow-on DWSS/SEM-N.

Submitted by W. Denig (NESDIS/NGDC) and M. Bonadonna (NESDIS/OFMC); 28 Sep 2011

# Milestone INTERMAGNET Data

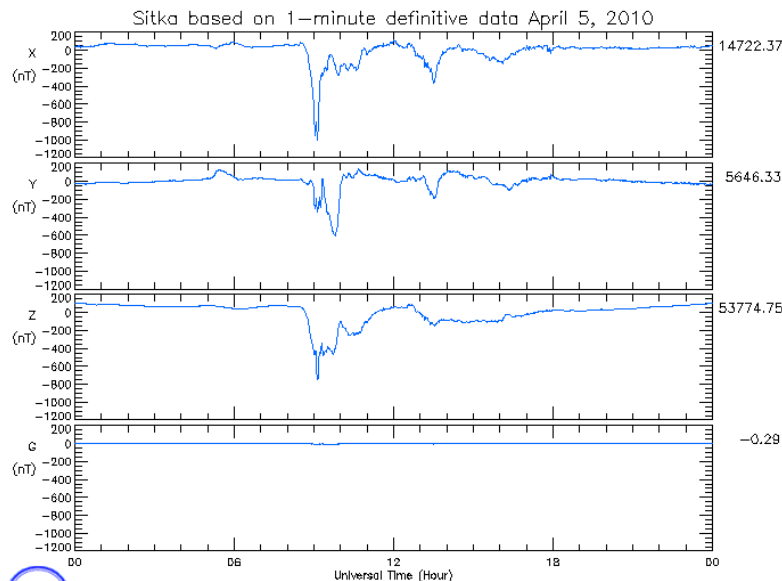


**Milestone:** Acquire available definitive geomagnetic data from the INTERMAGNET consortium for 2009 including data from over 100 magnetic observatories.

- **Planned Completion:** 4QFY11 (30 Sep 11)

- **Actual Completion:** 4QFY11 (30 Sep 11)

**Program Status:** INTERMAGNET definitive data for 2009 have been acquired and are now available via the Space Physics Interactive Data Resource (SPIDR).



Fort Churchill Magnetic Observatory (GSC)



# Milestones & Performance Measures

## FY11 Performance Measures



STP Annual Performance Measures								
Space Weather Metric								
LO	Goal	Objective	Performance Measure	POC	1QFY11	2QFY11	3QFY11	4QFY11
NWS	Weather-Ready Nation (NWS)	A More Productive and Efficient Economy Through Environmental Information Relevant to Key Sectors of the U.S. Economy	Greater than 95% (2 sigma) of available Space Environment Monitor satellite data are archived on an annual basis	Wilkinson	100%	100%	100%	100%
Nighttime Lights Metric								
LO	Goal	Objective	Performance Measure	POC	1QFY11	2QFY11	3QFY11	4QFY11
CS	Climate Adaptation and Mitigation (CS)	Improved Scientific Understanding of the Changing Climate System and Its Impacts	Acquire, process and disseminate >2 sigma (95%) of available real-time nighttime lights imagery within 3 hours of receipt	Elvidge	100%	100%	100%	100%
CORS								
LO	Goal	Objective	Performance Measure	POC	1QFY11	2QFY11	3QFY11	4QFY11
NOS	Resilient Coastal Communities and Economics (NOS)	Resilient Coastal Communities That Can Adapt To The Impacts Of Hazards And Climate Change	Provide a >2 sigma (95%) availability for Continuously Operating Reference Station (CORS) near-real-time data to the NWS Space Weather Prediction Center as per the '4-way' Memorandum of Agreement and subject to normal business-hour response times.	Coloma	100%	100%	99.8%	100%

As of 19 Oct 11

	Greater than 99% (3-sigma) Cumulative Distribution
	Greater than 97% (2-sigma) Cumulative Distribution
	Greater than 84% (1-sigma) Cumulative Distribution
	Below 84.1% (1-sigma) Cumulative Distribution

*Note: On 03 Jun 11 CORS-West experienced an unanticipated 5-hour break in service while CORS-East was undergoing maintenance. SWPC operations for US-TEC fell back on non-CORS data to maintain continuity with a modest degradation in service. There were no customer impacts reported during this blackout period.*



# FY12 AOP Milestones (Proposed)

## STP



Primary NGSP Goal: Objective	Performance (NOTE: Do not report Measure or Milestone Targets in the same row)					Measure or Milestone Targets (NOTE: Do not report Measure or Milestone Targets in the same row)													PRIMARY RESPONSIBILITY		
Select from the pull down menu	Measure	Milestone	Select any				10	11	12 Q1	12 Q2	12 Q3	12 Q4	13	14	15	16	17	18	LO/SO	Unit within LO/SO	Official
			GPRA	NOAA BSC	LO/SO BSC	HPPG															
Weather:Environmental Information	Complete the historical data rescue of daily H-alpha solar images from the NOAA Boulder Observatory (1967-1994)	Complete the historical data rescue of daily H-alpha solar images from the NOAA Boulder Observatory (1967-1994)							X										NESDIS	NGDC	C.Fox
Weather:Environmental Information	Archive interplanetary data simulation runs for the Enlil operational space weather model per NWS request	Archive interplanetary data simulation runs for the Enlil operational space weather model per NWS request								X									NESDIS	NGDC	C.Fox
Coastal:Marine Transportation	Achieve Initial Operating Capability (IOC) for disseminating in real-time satellite data received via McMurdo Station in compliance with the Antarctic Treaty	Achieve Initial Operating Capability (IOC) for disseminating in real-time satellite data received via McMurdo Station in compliance with the Antarctic Treaty									X								NESDIS	NGDC	C.Fox
Weather:Environmental Information	Develop in-house capability to process NOAA POES Space Enviroment Monitor (SEM) data for satellite operations	Develop in-house capability to process NOAA POES Space Enviroment Monitor (SEM) data for satellite operations										X							NESDIS	NGDC	C.Fox
Weather:Environmental Information	Complete Phase 3 Preliminary Design Reviews for GOES-R Level 2+ space weather algorithms	Complete Phase 3 Preliminary Design Reviews for GOES-R Level 2+ space weather algorithms										X							NESDIS	NGDC	C.Fox
Weather:Environmental Information	Maintain >95% of availability of Space Environment Monitor (SEM) satellite data archived on an annual basis	Maintain >95% of availability of Space Environment Monitor (SEM) satellite data archived on an annual basis					>95	100%	95	95	95	95	95	95	95	95	95	95	NESDIS	NGDC	C.Fox
Coastal:Marine Transportation	Acquire, process, and disseminate >95% of available real-time nighttime lights imagery within 3 hours of receipt	Acquire, process, and disseminate >95% of available real-time nighttime lights imagery within 3 hours of					>95	100%	95	95	95	95	95	95	95	95	95	95	NESDIS	NGDC	C.Fox
Weather:Environmental Information	Provide a >95% avallability for Continuously Operating Reference Station (CORS) near real-time data to the NWS Space Weather Prediction Center	Provide a >95% availability for Continuously Operating Reference Station (CORS) near real-time data to the NWS Space Weather Prediction Center					>95	100%	95	95	95	95	95	95	95	95	95	95	NESDIS	NGDC	C.Fox



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# Personnel Activities

## Welcome to the GOES-R Team



STP welcomes the GOES-R team of Mary Shouldis, Dr Juan Rodriguez and Jonathan Darnel. This team is responsible for developing L2+ space weather algorithms and for supporting cal/val activities. The overall team also includes the participation of other SWPC and NGDC scientists.

### Product Set 3 Algorithms

**XRS.10: Flare Location**

**EUVS.05: Multi-wavelength proxy**

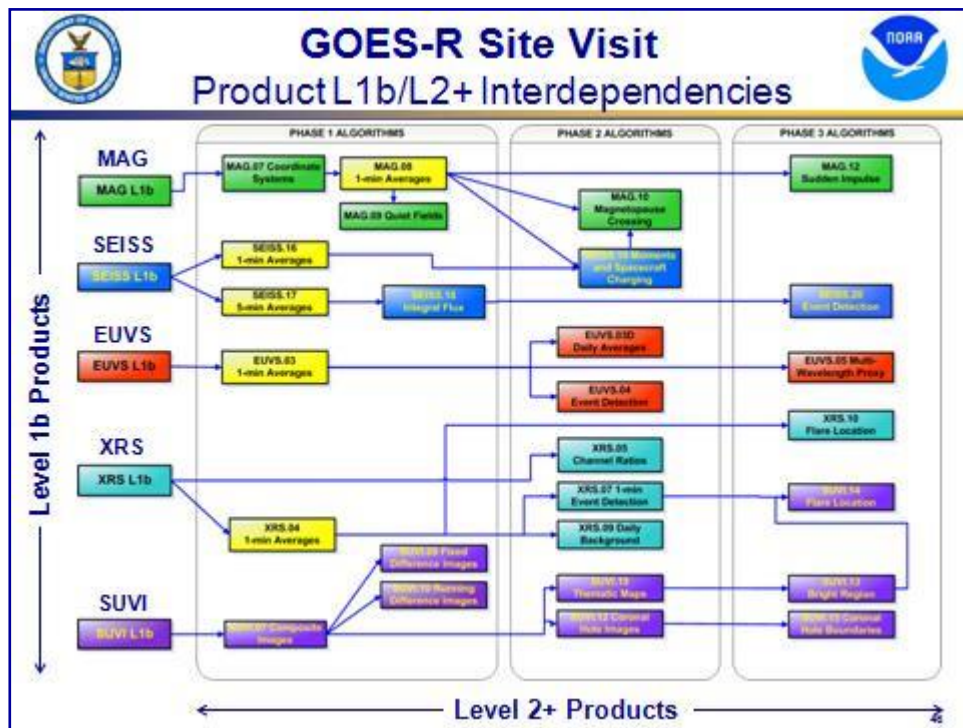
**SEISS.20: Event detection based on flux values**

**MAG.12: Sudden Impulse (SI) detection**

**SUVI.13: Bright Region Data**

**SUVI.14: Flare Location (XFL) reports**

**SUVI.15: Coronal Hole Boundaries**



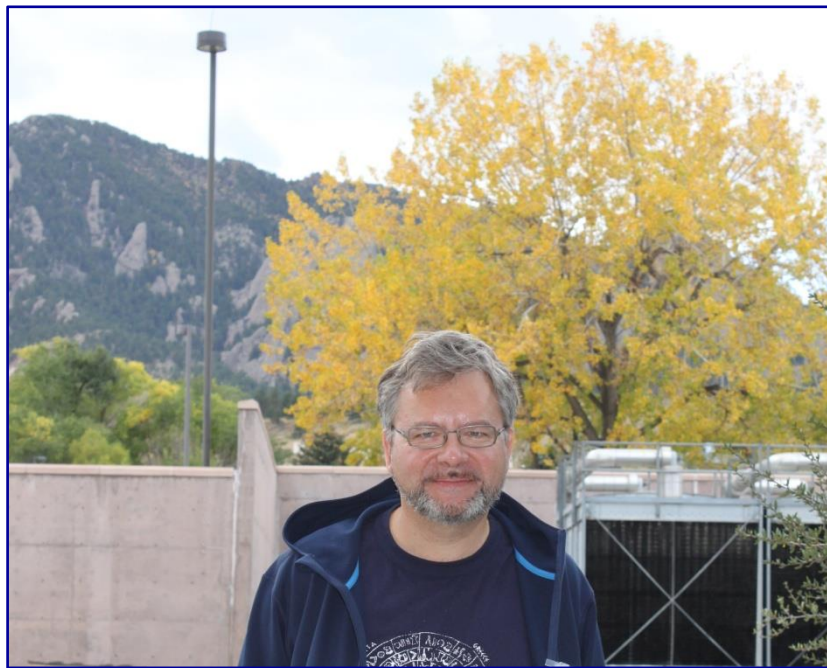


# Personnel Activities

## Does This Guy Look Familiar??



Dr. Mikhail Zhizhin recently visited NGDC to apply advanced imaging processing techniques to improve the annual cloud-free mosaics prepared by Chris Elvidge's team. During his short visit, Misha created a look-up table that enables the Nighttime Lights team to combine low-resolution MET products with higher resolution DMSP images to better discern land/ocean transitions.



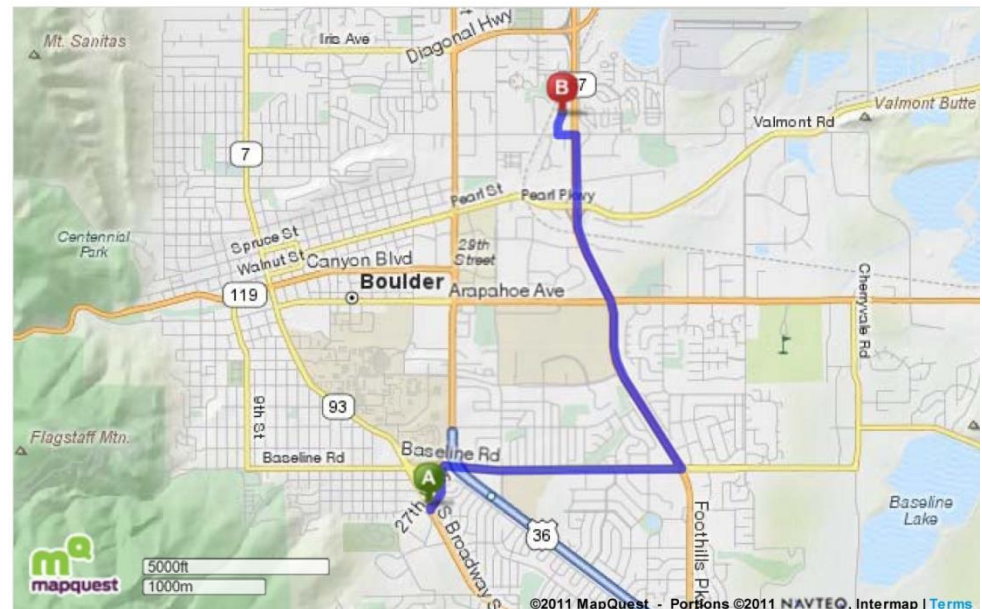


# Personnel Activities

## Farewell to Tom Bogdan



Dr. Tom Bogdan will be leaving SWPC to become the next president of the University Corporation for Atmospheric Research (UCAR). He will depart NOAA on January 8. Over the past 5 years Tom has had a profound impact on SWPC and on the National and international space weather communities. Congratulations to Tom – you will be missed.





# Personnel Activities

*Thanks for your vote of confidence!*



I was personally honored and humbled to receive the 2011 Director's Award. This award recognizes an individual or group that has "significantly enhanced NGDC's reputation in the external world". Cited work was the environmental assessment for the Galaxy-15 satellite anomaly.





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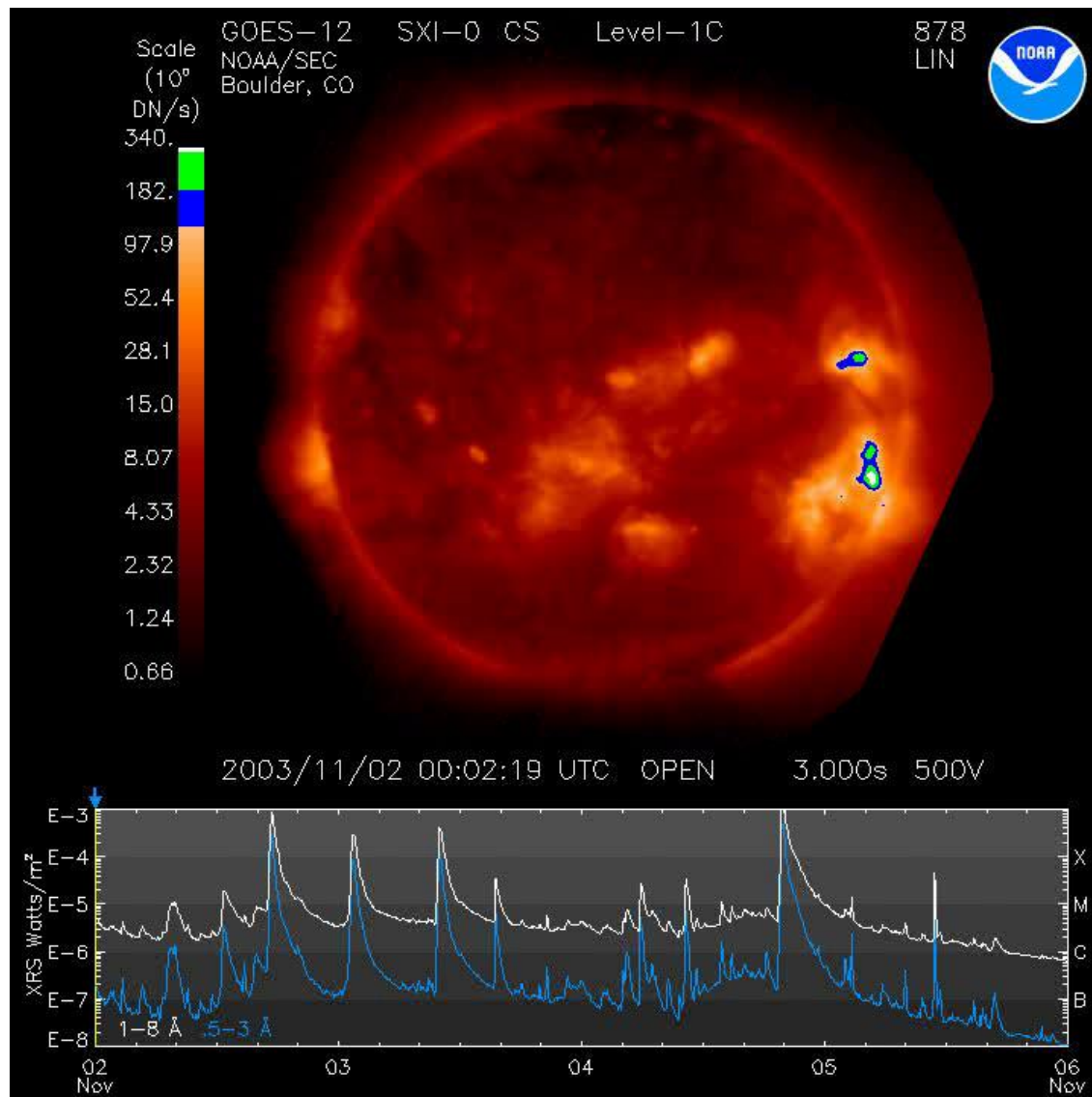


# Accomplishment

## SXI/XRS Composite Slide



Dan Wilkinson has developed a new data visualization product that combines GOES SXI imagery with classic X-Ray time series data. This effort was supported by the GOES-R Risk Reduction program.





# Accomplishment

## GOES-NOP ITAR & Proprietary



The NOAA National Geophysical Data Center (NGDC) seeks to make publicly available the sensor descriptions and sensor characterization and performance data in GOESN-ENG-048 Rev D (EPS/HEPAD Calibration and Data Handbook) that are needed by the user community in order to properly use the data from GOES 13-15 EPS/HEPAD.

Background: Technical data related to the GOES NOP instruments, previously listed as proprietary, has been approved for release. The technical data has also been reviewed for possible ITAR issues. **Juan Rodriguez** has worked with the GOES COTR (proprietary issues) and Mark Mulholland (ITAR) to release standard documentation for processing/re-processing the GOES SEM data.

Table 5-9. MAGPD Proton Channel Gf(E) Values for Protons (Ref. 21)

MP1 Gf(E)		MP2 Gf(E)		MP3 Gf(E)		MP4 Gf(E)		MP5 Gf(E)	
Energy (keV)	Gf(E) (cm <sup>2</sup> -sr)	Energy (keV)	Gf(E) (cm <sup>2</sup> -sr)	Energy (keV)	Gf(E) (cm <sup>2</sup> -sr)	Energy (keV)	Gf(E) (cm <sup>2</sup> -sr)	Energy (keV)	Gf(E) (cm <sup>2</sup> -sr)
75	1.0E-4	105	1.0E-4	165	1.0E-4	245	1.0E-4	345	1.0E-4
85	1.0E-2	115	1.0E-2	175	1.0E-2	255	1.0E-2	355	1.0E-2
105	1.0E-2	165	1.0E-2	245	1.0E-2	345	1.0E-2	795	1.0E-2
115	1.0E-4	175	1.0E-4	255	1.0E-4	355	1.0E-4	805	1.0E-4

Table 5-10. MAGPD Proton Channel Gf(E) Values for Electrons (Ref. 21)

Electron Energy (keV)	Gf(E) (cm <sup>2</sup> -sr)					
	1MP1	1MP2	1MP3	1MP4	1MP5	Total
770	1.23E-04	4.11E-04	1.78E-04	2.78E-04	1.59E-04	1.15E-03
802	2.06E-04	6.01E-04	1.91E-04	2.33E-04	1.47E-04	1.38E-03
1140	4.53E-04	1.16E-03	2.10E-04	2.65E-04	1.22E-04	2.20E-03
1620	1.65E-03	1.53E-03	2.13E-04	1.57E-04	6.85E-05	3.61E-03
2100	9.94E-04	1.82E-03	3.08E-04	2.19E-04	1.09E-04	3.46E-03
2600	5.64E-03	6.50E-03	3.59E-03	3.65E-03	1.43E-03	2.08E-02

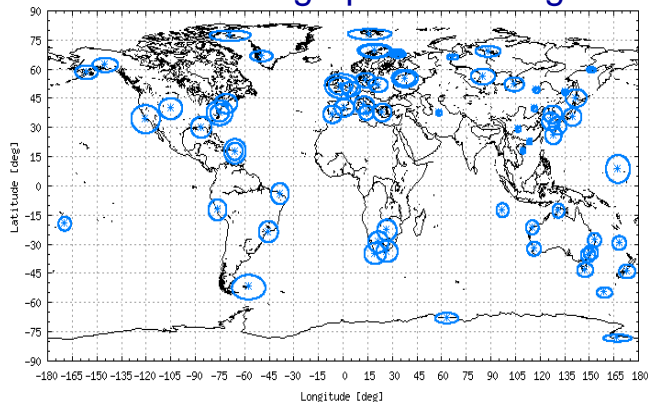


# Accomplishment

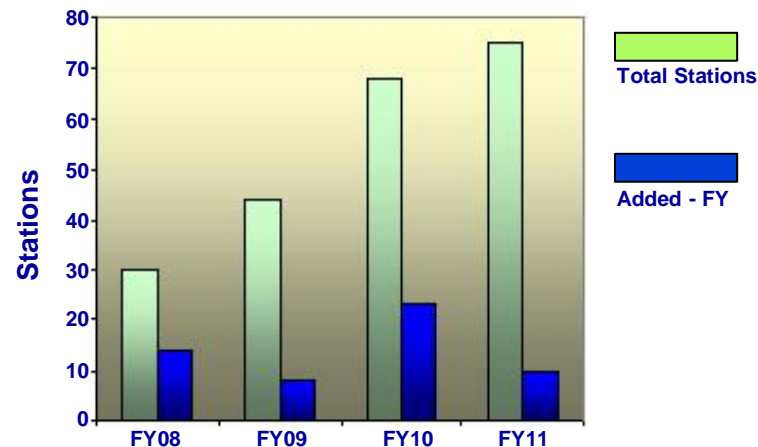
## Mirrion Passes the 70-Station Mark



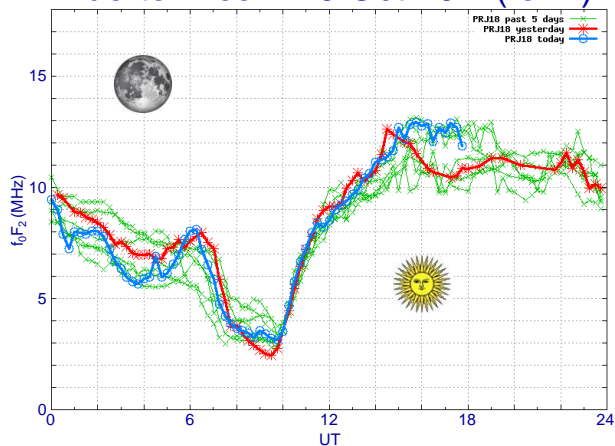
Mirrion Geographic Coverage



Number of RT Stations



Puerto Rico – 20 Oct 2011(foF2)



- NGS Contract renewed for FY12
- No. of RT sites ~70; Goal ~100
- Primary Users: AFWA, SWPC
- Fewer new sites coming on-line:
  - ✓ Low hanging “fruit” now gone
  - ✓ Restricted operational access
  - ✓ Limited site-specific analysis SW
- Puerto Rico Sounder Restored



# Accomplishment

## E-mail List Service to Notify Users of Product Changes



**New!**

An e-mail subscription service has been set up on the STP website.

There are e-mail lists for eight data groups.


STP managers will send subscribers occasional automatic alerts for:

- format changes
- reprocessed data sets
- new data sets

The subscriber lists provide NGDC with an indication of who the data users are.

Brought to you by : Ernie Joynt, Tom Carey and Anu Sundaravel

[STP](#) [Online](#) [FTP](#) [SPDR](#) [What's New](#) [FAQ](#)



atism  
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ervations

**STP Mailman E-mail List Service**

Below is a listing of all the email subscription lists for NOAA NGDC STP. Subscribers to these lists will receive occasional emails regarding the datasets such as revisions, format changes or new data sets.

Click on a list name to get more information about the list, or to subscribe, unsubscribe, and change the preferences on your subscription. If you are having trouble using the lists, please contact: [mailman@mailman.ngdc.noaa.gov](mailto:mailman@mailman.ngdc.noaa.gov).

List Name	Description
<a href="#">Aurora</a>	Subscribers to this list will receive occasional updates regarding aurora data and images as well as the Ovation Prime model at NOAA NGDC.
<a href="#">DMSP</a>	Subscribers to this list will receive occasional updates regarding DMSP data archived at NOAA NGDC. The data include observations of precipitating electron and ion fluxes from the SSJ, magnetic fields from the SSM, and thermal ion and electron parameters from the SSIES instruments aboard DMSP satellites F6 to F20.
<a href="#">Ionosphere</a>	Subscribers to this list will receive occasional updates regarding ionosonde data and models at NOAA NGDC. The models include US-TEC, D-RAP and FIRST.
<a href="#">Solar</a>	Subscribers to this list will receive occasional updates regarding various observations of solar phenomena that are archived at NOAA NGDC.
<a href="#">Space Weather Indices</a>	Subscribers to this list will receive occasional updates regarding derived space weather indices that are archived at NOAA NGDC.
<a href="#">SXI GOES</a>	Subscribers to this list will receive occasional updates regarding the the GOES Solar X-ray Imager (SXI) data at NOAA NGDC. The SXI data are from GOES-12 through GOES-15 and are valuable for monitoring rapidly changing large scale solar activity. The data time range is from 2001 to the present.
<a href="#">SEM_POES</a>	Subscribers to this list will receive occasional updates regarding the POES Space Environment Monitor (SEM) data at NOAA NGDC. The data are electron and ion data from the SEM subsystems on polar-orbiting POES and METOP satellites and cover 1978 to the present time.
<a href="#">SEM_GOES</a>	Subscribers to this list will receive occasional updates regarding the GOES Space Environment Monitor (SEM) data at NOAA NGDC. The SEM data are magnetometer, energetic particle, and soft X-ray data from the the GOES 1 to 15 as well as SMS 1 and 2 and cover July 1974 to the present time.

[DC > STP > Space Weather](#)Questions: [William.Denig@noaa.gov](mailto:William.Denig@noaa.gov)

[NGDC Home](#) | [Contacts](#) | [Data](#) | [Disclaimers](#) | [Education](#) | [News](#) | [Privacy Policy](#) | [Site Map](#)

# Accomplishment

## Space Environment Gap Analysis (SEGA)

The Final Report for the SEGA was submitted by the OFCM to the OSTP on 30-Sep-11. The SEGA JAG was asked to analyze the National architecture for space environmental monitoring. The report identified key space weather systems that if not replaced would lead to a significant degradation in capability.



ACE



DSCOVR

# Phenomena Observing Requirements Satisfaction (Worst Case) <sup>FOUO</sup>

	Nowcasts (Current Conditions)			Short-term Forecasts (minutes to hours)			Long-term Forecasts (hours to days)		
Timeline (years)	0-3	4-7	8-12	0-3	4-7	8-12	0-3	4-7	8-12
Geomagnetic Storms	G	G	G	Y <sup>3</sup>	O	O	Y <sup>4</sup>	O	O
Radio Blackouts	G	G	G	O	O	O	Y	Y	Y
Solar Radiation Storms	G	G	G	Y <sup>2</sup>	R	R	O	O	O
Ionospheric Storms	Y	Y	O <sup>1</sup>	Y <sup>3</sup>	O	O	Y <sup>4</sup>	R	R
Atmospheric Drag	Y	Y	O <sup>1</sup>	Y <sup>3</sup>	O	O	Y <sup>4</sup>	R	R

*Substantial degradation over time if systems aren't sustained or replaced*

G	Meets Requirements
Y	Limited Capability
O	Severely Limited Capability
R	Fails to Meet Requirements

- (1) Loss of the UV sensors of the DMSP spacecraft.
- (2) Loss of relativistic electron data SOHO.
- (3) Uncertainty of solar wind data from L1 to replace ACE.
- (4) Uncertainty of getting a space-based coronagraph to replace SOHO and STEREO data.

FOUO

Office of the Federal Coordinator for Meteorology

For Official Use Only  
Predictational information not releasable outside of US Government

26

**Phenomena Observing Requirements Satisfaction (Best Case)** <sup>FOUO</sup>

Timeline (years)	Nowcasts (Current Conditions)			Short-term Forecasts (minutes to hours)			Long-term Forecasts (hours to days)		
	0-3	4-7	8-12	0-3	4-7	8-12	0-3	4-7	8-12
Geomagnetic Storms	G	G	G	Y	3	Y	Y	Y	Y
Radio Blackouts	G	G	G	O	O	O	Y	Y	Y
Solar Radiation Storms	G	G	G	Y	2	Y	O	O	O
Ionospheric Storms	Y	Y	1	Y	Y	Y	Y	Y	Y
Atmospheric Drag	Y	Y	1	Y	Y	Y	Y	Y	Y

*Requirements Satisfaction maintained or improved if key systems are sustained or replaced*

G	Meets Requirements
Y	Limited Capability
O	Severely Limited Capability
R	Fails to Meet Requirements

(1) COSMIC-2 deployed and loss of DMSP UV sensors mitigated.  
 (2) Relativistic electron data from SOHO are obtained.  
 (3) Solar wind data from L1 to replace ACE is obtained.  
 (4) Space-based coronagraphs on SOHO and STEREO are replaced.  
 (5) Advanced plasma sensor on DSCOVR follow-on obtained.

FOUO Office of the Federal Coordinator for Meteorology For Official Use Only Predictational information not releasable outside of US Government 27



# Accomplishment CORS-In-CLASS



The CORS-In-CLASS team has completed the operational implementation of NGDC's first dataset into CLASS. This effort is the pathfinder for the remaining NGDC datasets that will be transitioned to CLASS over the next few years. Way to go, Fran, Rob, Peter, Dan, Scott, Kelly, Ernie and Ben. *More exciting details to be revealed at Kelly's quarterly.*





# Status Update

## POES Re-processing



The POES re-processing project has successfully completed its phase 1 objective of directly ingesting SEM-2 data received from OSPO. Completion of this project is a 4QFY12 milestone.

### POES Team

#### Oversight

Tom Carey

#### Data Receipt:

Tom Carey

Ernie Joynt

#### Archive and Retrieve

Tom Carey

Ernie Joynt

#### Process/Reprocess

Anu Sundaravel

Janet Green

Janet Machol

Ken Tanaka

#### Daily File Processing

Ken Tanaka

#### FTP Maintenance

Tom Carey

Ernie Joynt

#### Oracle Database

John Larocque

#### Online Distribution

Anu Sundaravel

Dan Wilkinson

#### RSS News Feeds

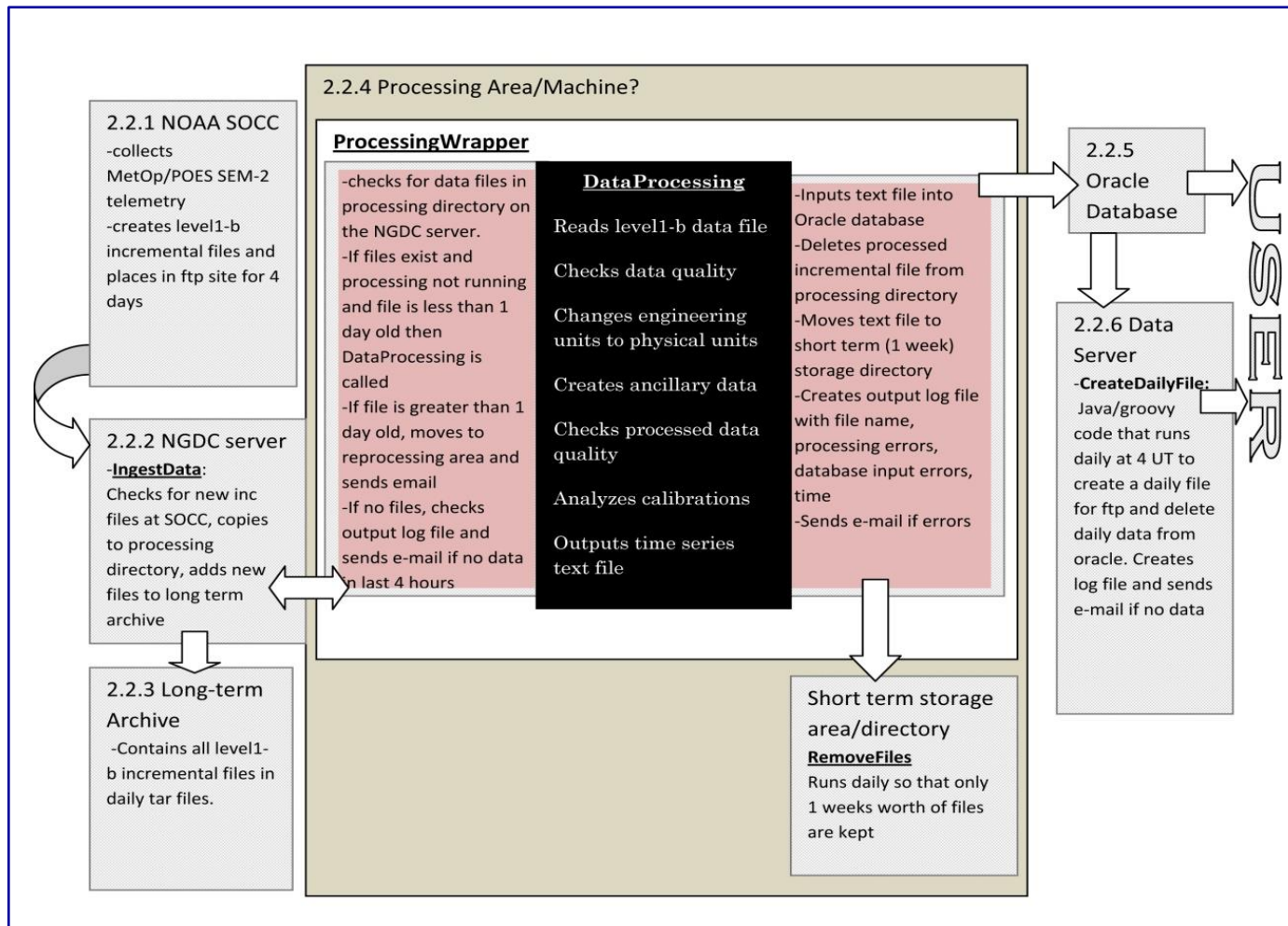
Dominic Fuller-Rowell

#### Metadata

Anna Milan

Janet Machol

Janet Green





# Status Update

## DMSP Data via McMurdo



### Roles and Responsibilities (NOAA/NGDC)

- Ensure compliance with Antarctic Treaty of 1959 by providing SMD to the general public without any artificial delay or military advantage
- Post AFWA's pre-processed, stored DMSP data, down-linked from McMurdo, to the NGDC public website

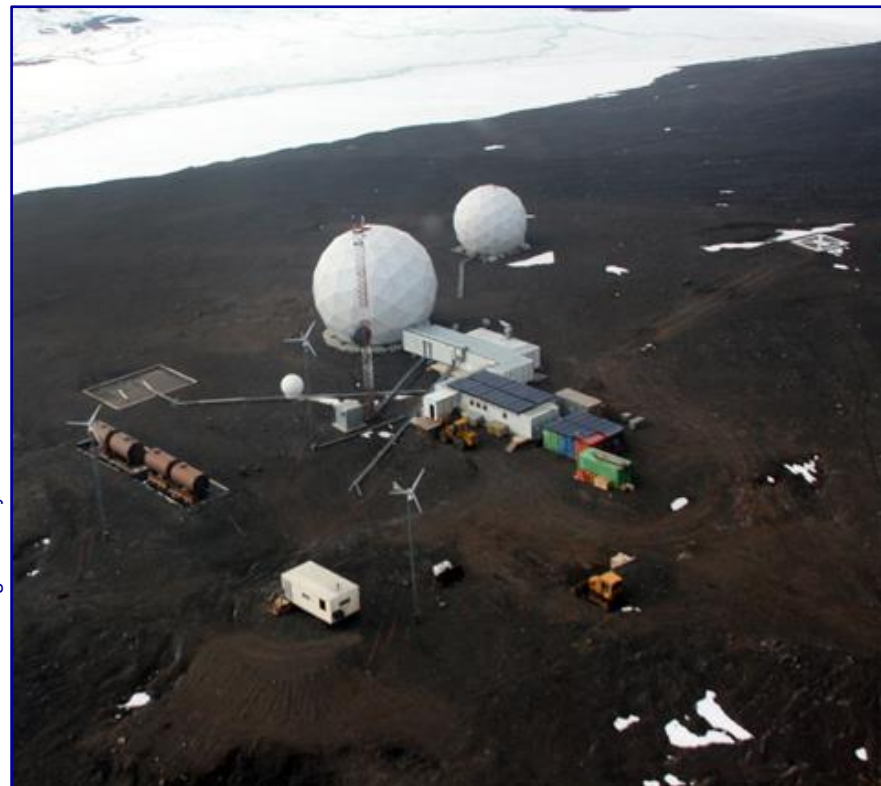
Initial Operational Capability (IOC): Spring 2012

### NGDC Action Status:

- Prototype concept testing – complete
- Assign filename structure – complete
- Test receipt of data (ftp) – complete
- Establish temp directory – complete
- Link to SPIDR – in process
- Receive live data – awaiting IOC



Photo Credit: Doug Whiteley



NOAA Black Island Communications Facility



# Status Update

## ADIC testing



ADIC Scalar 10K Tape Library

Rob Redmon has been actively testing the ADIC API. Interoperability tests with various clients (Ruby, Groovy and IDL) have shown the API to be stable under low but continuous requests over several multi-day periods.

Remaining activities:

- *Test the TLS under realistic load profiles requiring the system to deliver both cached and non-cached datasets*
- *Migrate additional STP datasets to the new TLS system ASAP pending availability of ISD personnel*



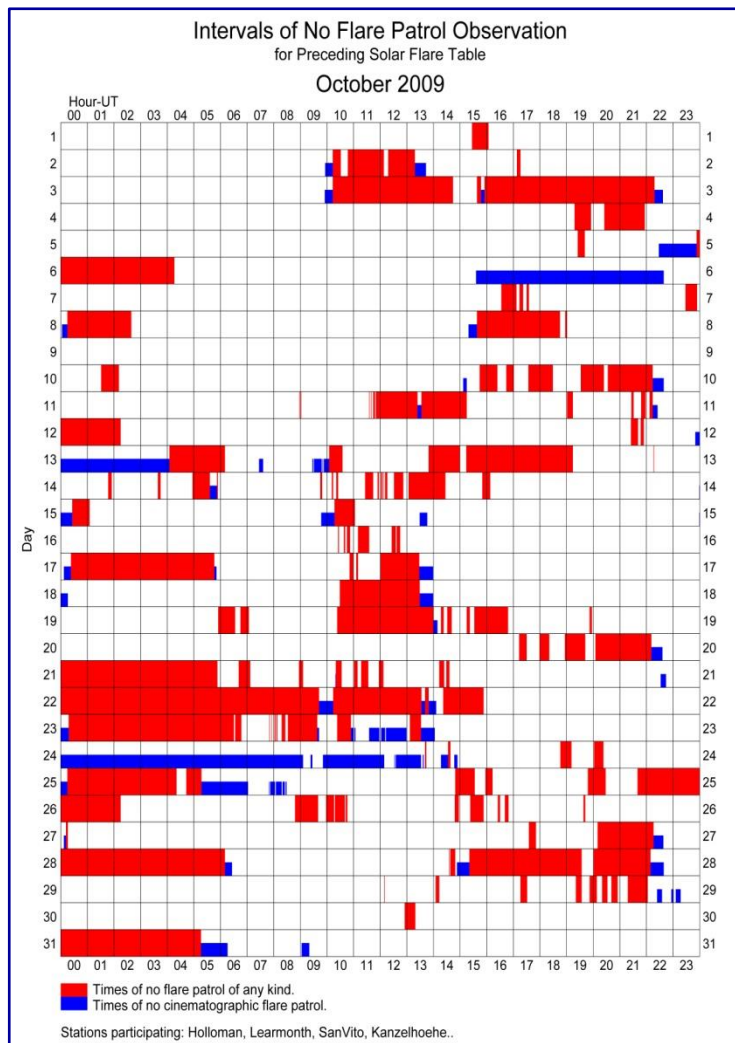


# Status Update

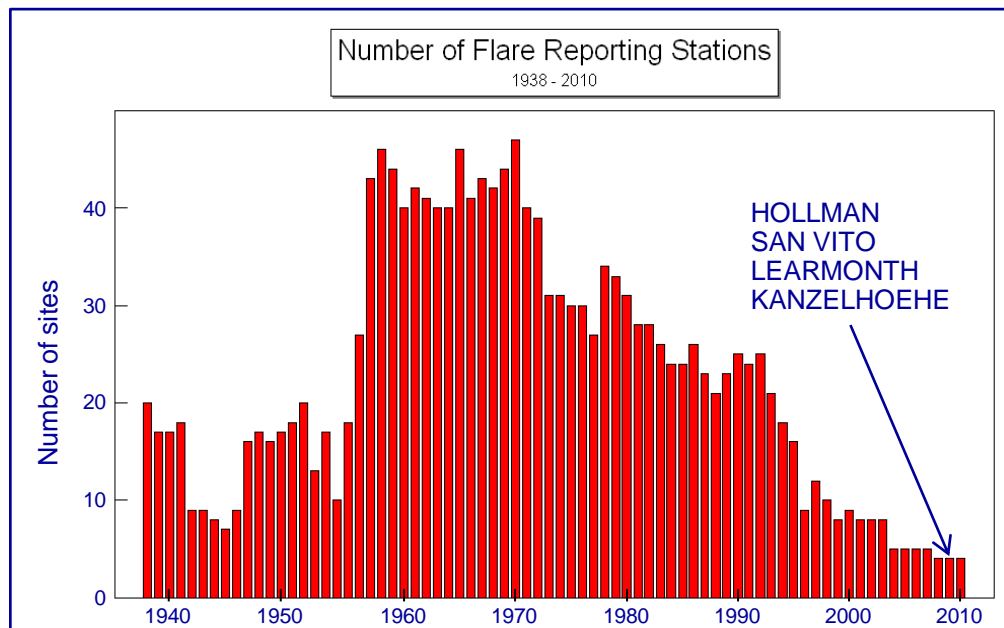
## NGDC Solar & Geomag Indices Program



### Proposed termination of the NGDC Flare Patrol product



Since 1955 STP has produced the annual Flare Patrol product (text file) detailing periods of daily solar monitoring by various ground-based observatories. The number of reporting sites is currently 4, down from >40 reporting observatories during the 60's. Justin Mabie is reviewing all solar & geomag datasets. Dan Kowal providing guidance.



Known Affected User: Cancellation of the Flare Patrol will impact the production of the *Flare Index* by the Kandilli Observatory (Turkey).



# **OUTLINE**

## **Solar & Terrestrial Physics Division**



**STP Program Overview**

**Milestones & Performance Measures**

**Personnel Activities**

**Accomplishments & Updates**

**→ Special Interest Items**

**Greg Mandt Visit**

**Issues & Summary**



# Special Interest Item

## Aricebo Radar



Pretti's visit to the Aricebo Radar

4QFY11 PMR – 25 Oct 2011

Preeti Bhanija and Terry Bullett recently traveled to Puerto Rico to repair the ionosondes located at the San Juan Magnetic Observatory (USGS), Cayey. The co-located VIPIR and digisonde radars provide complementary views of the local ionosphere.



***The archive status of VIPIR data is unknown***



# Special Interest Item

## National Solar Observatory (NSO)



### National Solar Observatory

#### AURA Selects University of Colorado, Boulder for NSO Headquarters



\*\*\*\*\*EMBARGOED UNTIL SEPTEMBER 30, 2 PM EDT\*\*\*\*\*

Washington -- The Association of Universities for Research in Astronomy ([AURA Inc.](#)) announced today that it has selected the University of Colorado, Boulder for the future site for the National Solar Observatory ([NSO](#)). NSO is operated by AURA under a cooperative agreement with the National Science Foundation ([NSF](#)) for the benefit of the astronomical community.

Dr. Dan Clemens of Boston University, chair of the AURA Board said *"This was a very difficult decision for the AURA Board, one of the most difficult in AURA's history. For over 40 years, AURA has been the steward for the NSO and the chief advocate for ground-based solar astronomy. We considered all of the issues in detail, and made a decision aimed at advancing the best interests of solar astronomy for today and for the future."*

NSO's mission is to advance knowledge of the Sun, both as an astronomical object and as the dominant external influence on Earth, by providing forefront observational opportunities to the research community. A major new NSO initiative is the 4-meter Advanced Technology Solar Telescope ([ATST](#)) that will begin construction in the near future.

NSO currently operates long-term observing networks at the Kitt Peak National Observatory near Tucson, and the Sacramento Peak Observatory in New Mexico. NSO plans to ramp down operations at the older telescopes, some dating to the 1950s. The changes, coupled with the development of the ATST, require that NSO consolidate its headquarters in one site.

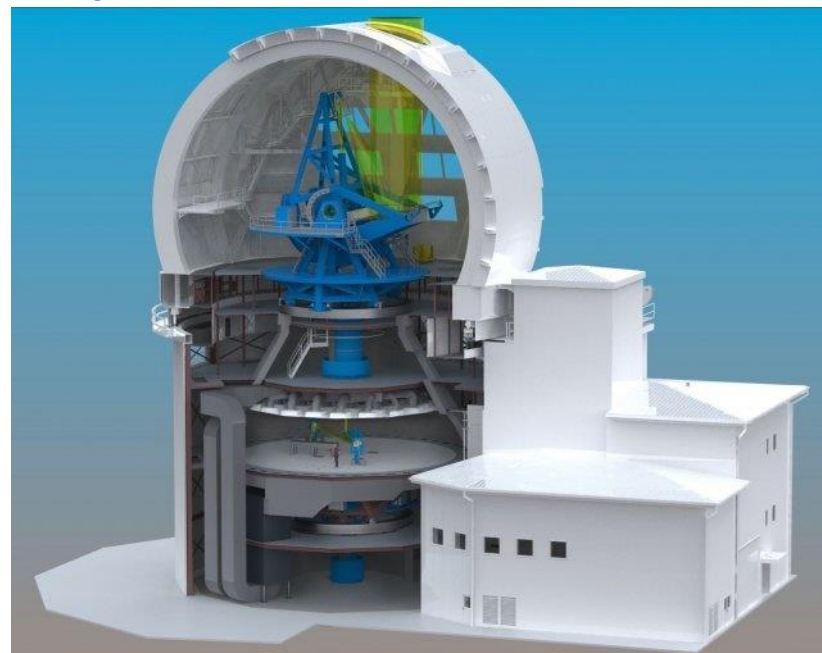
Over the next several years, pending availability of funding from the NSF, the NSO will move from its present locations to the new Boulder headquarters. In addition, some of the staff will go to the base operations facility being developed for the ATST on Haleakala on Maui. AURA will submit a proposal to the NSF in 2014 which will include the details of its partnership with the University of Colorado and will propose the necessary funding to accomplish the move.

Dr. Stephen Keil, director of the NSO, said *"This decision highlights the importance of the NSO and sets the stage for its future growth. We will strive to make this transition as smooth as possible for the employees and I know that our new host will work to create a welcoming and productive environment."*

Seven organizations from Alabama, Arizona, California, Colorado, Montana, and New Mexico responded to the initial request for proposals. An AURA selection team conducted a detailed review of those proposals. In early April 2011, AURA focused on two finalists, the University of Alabama, Huntsville, and the University of Colorado, Boulder.

AURA President William S. Smith, Jr. said, *"Both finalists presented strong, highly attractive proposals that benefit the science community, the NSO, and offer a cost-effective environment for conducting NSO operations. Following detailed discussions and site visits, we decided that the University of Colorado, Boulder offered the best long-term host site for the NSO."*

The selection of CU for the NSO HQ will strengthen Boulder's leadership in solar physics. The HQ move from Tucson to Boulder will take place over several years. Activities at the Kitt Peak (AZ) and Sacramento Peak (NM) solar observatories will be ramped down as the ATST in Maui (HI) is brought on-line.



Advanced Technology Solar Telescope (ATST)



# Special Interest Item

## U.K./U.S. SWx Workshop – 11-13 Oct 11



The White House

Office of the Vice President

For Immediate Release

May 25, 2011

### Strengthened Collaboration Between the United States and United Kingdom

The Prime Minister and President Obama announced today six specific areas where the United Kingdom and the United States will strengthen our cooperation in the coming months. They span security and support to Armed Forces personnel; commitments to collaboration in science, higher education, volunteerism and international development; and the development of cyberspace.

In summary:

#### Strengthened collaboration in science and higher education

The UK and the United States will increase the links between our higher education institutions through increased post-graduate student and researcher exchange programs. We will also collaborate on a number of significant research projects and will embark together on an ambitious program to create the world's first combined space weather model.

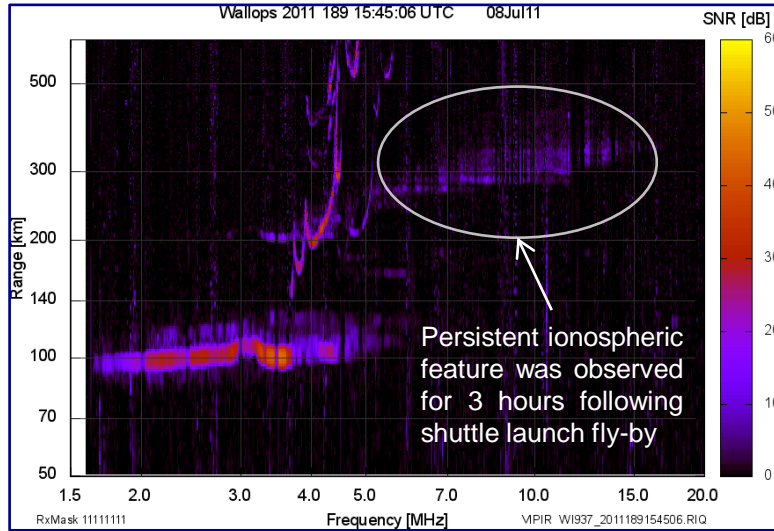
Workshop Objectives (per R. Viereck):

- Identify the research needs in support of space weather operations
  - What are the relevant research topics with possible results in the 1-3 year time frame?
  - What about the 3-5 year time frame?
- Identify key data sets needed in support of space weather operations
  - What observations are needed to drive models?
  - What observations are needed to validate model results?
- What are some key areas where US-UK research collaboration would benefit space weather operations?
- Develop a prioritized roadmap for US-UK research activities

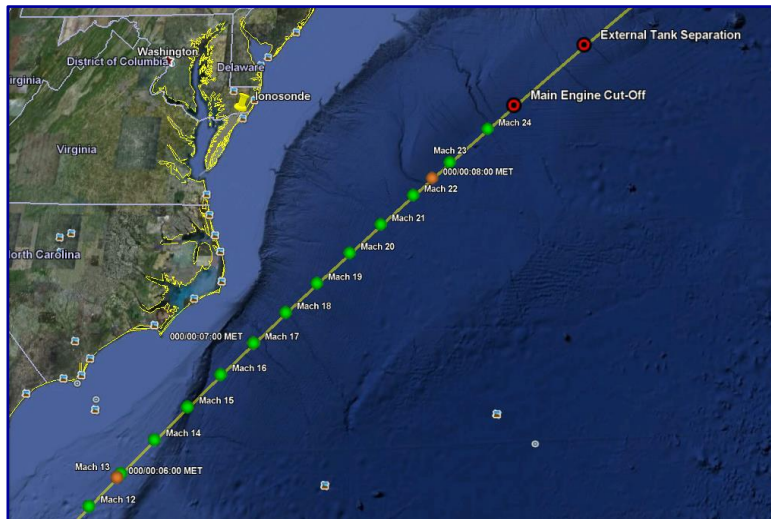
Sponsored by the Sciences and Innovation Section of the British Consulate-General, NSF's Division of Atmospheric Sciences, NASA's Heliospheric Physics Division, and NOAA's SWPC.

# Special Interest Item

## Space Shuttle Ionosphere Effects – 1 of 2



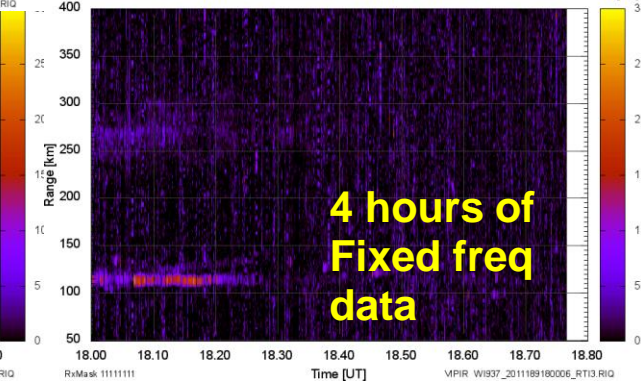
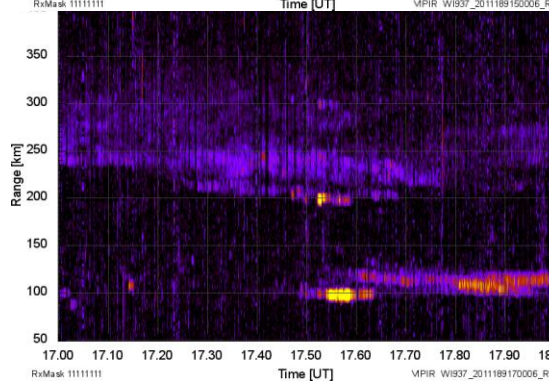
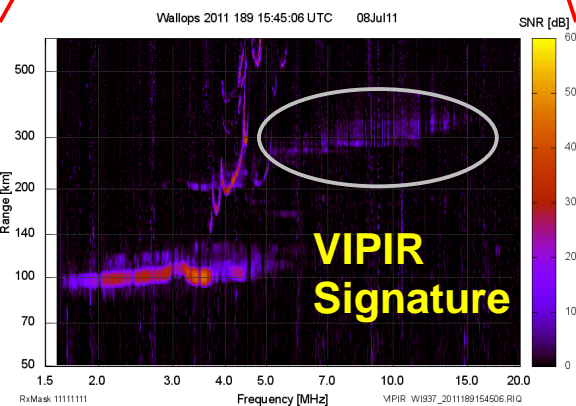
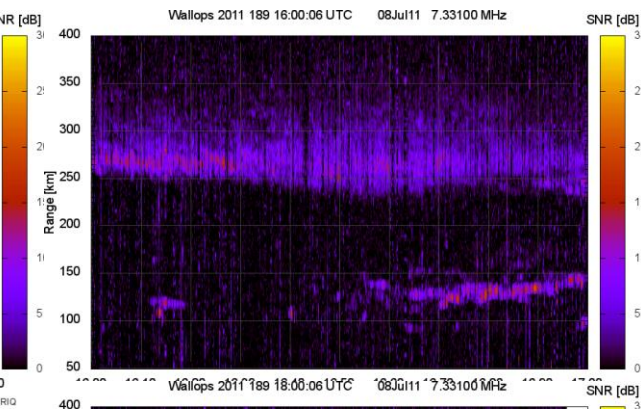
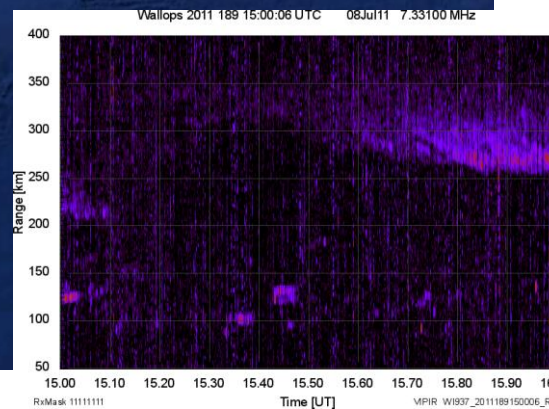
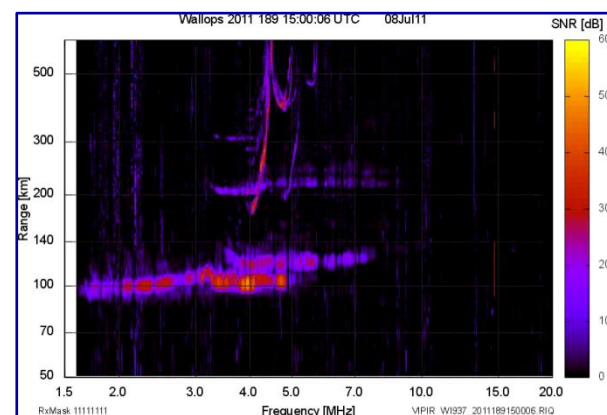
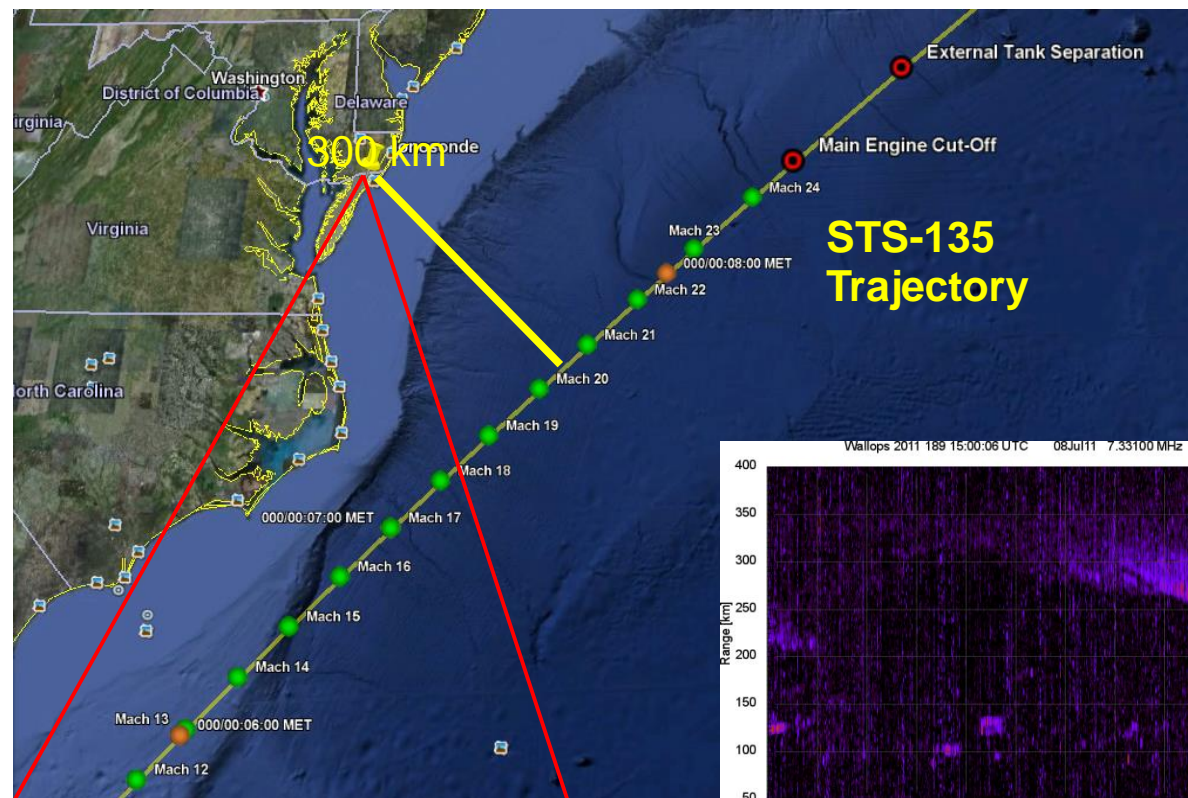
During the ascent of the space shuttle on July 8, 2011 the Atlantis passed within the FOV of the VIPER ionospheric sounder prior to main engine cutoff and external tank separation. The principal fuel used during launch is liquid hydrogen and liquid oxygen along with small quantities of the fuel monomethylhydrazine  $[\text{CH}_3(\text{NH})\text{NH}_2]$ . However the persistent (3 hr) feature suggests the presence of metallic ions which have a slow recombination rate. Where did these ions come from?





# Special Interest Item

## Space Shuttle Ionosphere Effects – 2 of 2



4 hours of  
Fixed freq  
data



# **OUTLINE**

## **Solar & Terrestrial Physics Division**



**STP Program Overview**

**Milestones & Performance Measures**

**Personnel Activities**

**Accomplishments & Updates**

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**→ Greg Mandt Visit**

**Issues & Summary**



# Action for the Director

## Sci2Ops for GOES-R SWx L2+ Products



**Issue** – The Sci2Ops transition of the GOES-R L2+ SWx products is currently a proposed unfunded option (#3) for the GOES-R ground segment contract (Harris Corp)

**Background** – As a part of the SWPC transfer of function, NGDC will assume responsibility for the continued development of L2+ science-grade algorithms for the GOES-R SWx sensors (EXIS, SUVI, MAG). Overall, there are 31 discrete L2+ products that have been delivered to STAR, currently under development or planned for development (slides 2 & 3). In FY11 the product developmental team (including Shouldis, Rodriguez, Lotoaniu, and Rigler) was awarded a 3-year contract for the development of the Version 3 science-grade algorithms through the GOES-R Risk Reduction program (Ingrid Guch). Currently the sci2ops path for these L2+ products is via a proposed (undefined and unfunded) "Option 3" contract mod for the GOES-R ground processing segment. Internal NOAA cost estimates for the development, integration and test, transition to operations, and sustainment (modification & upgrades) are at the level of \$33M (FY09\$) for 10 years (slide 4). Without a clear sci2ops transition path the L2+ product developments remain at risk and are not optimally aligned to the GOES-R ground segment development.

**Recommendation** – Recommend that Chris Fox engage Greg Mandt (and perhaps Tom Bogdan) in discussions regarding how to define the “sci2ops” path for the GOES-R L2+ SWx products.



# Gregg Mandt's Visit

## Sci2Ops for GOES-R SWx L2+ Products



### ***GOES-R Program Office Visit***

**26 Oct 2011**



**William Denig**  
Solar & Terrestrial Physics Division  
NOAA/NESDIS/NGDC  
303 497-6323  
[William.Denig@noaa.gov](mailto:William.Denig@noaa.gov)



# GOES-R Site Visit

## Sci2Ops for GOES-R SWx L2+ Products



Greg Mandt and Steve Goodman will visit NGDC and SWPC on Wednesday afternoon (26 Oct). Greg is the program manager for the GOES-R program whereas Steve is his chief scientist. The principal reason for the visit is to consider options for the operational processing of GOES-R SWx L2+ products. These products are currently under development within NGDC.



### Agenda – 26 Oct 11

12:30 – 12:45	Meet with C. Fox / E. Kihn
12:45 – 13:00	STP Overview (GOES-R)
13:00 – 13:15	SWPC Requirements
13:15 – 13:45	Open Discussions/options
13:45 – 14:00	Focused Discussions
14:00 – 14:15	Wrap-up with Chris



# GOES-R Site Visit

## NGDC Space Weather Program



### *The NGDC SWx program is housed within the Solar & Terrestrial Physics (STP) Division*

**Mission** – *To be the Nation's steward of retrospective operational space environmental data and information*

**Vision** – *An informed society reliant on accurate and effective historical space weather data for emergency planning, environmental specifications and heliophysics research*

**Goal** – *Ensure that NGDC is the authoritative provider of high-quality, accessible, historical space environmental datasets derived from the Nation's operational space weather services*

**Priorities** (Highest to Lowest):

1. Stewarding NOAA's space environmental satellite datasets and related information
2. Managing USAF retrospective operational space weather satellite & ground data
3. Participating in the World Data Service by contributing NOAA and USAF datasets plus related data services



# GOES-R Site Visit



## Functional Alignments – SWPC & NGDC

### SWPC Focus Areas RT Operational Support

- Space Situational Awareness
- Forecasting
- Model Transition
- Model Science
- Product Development
- Instrument Requirements
- Display Systems
- Customer Requirements
- Stakeholders

### NGDC Focus Areas Satellite Data Services

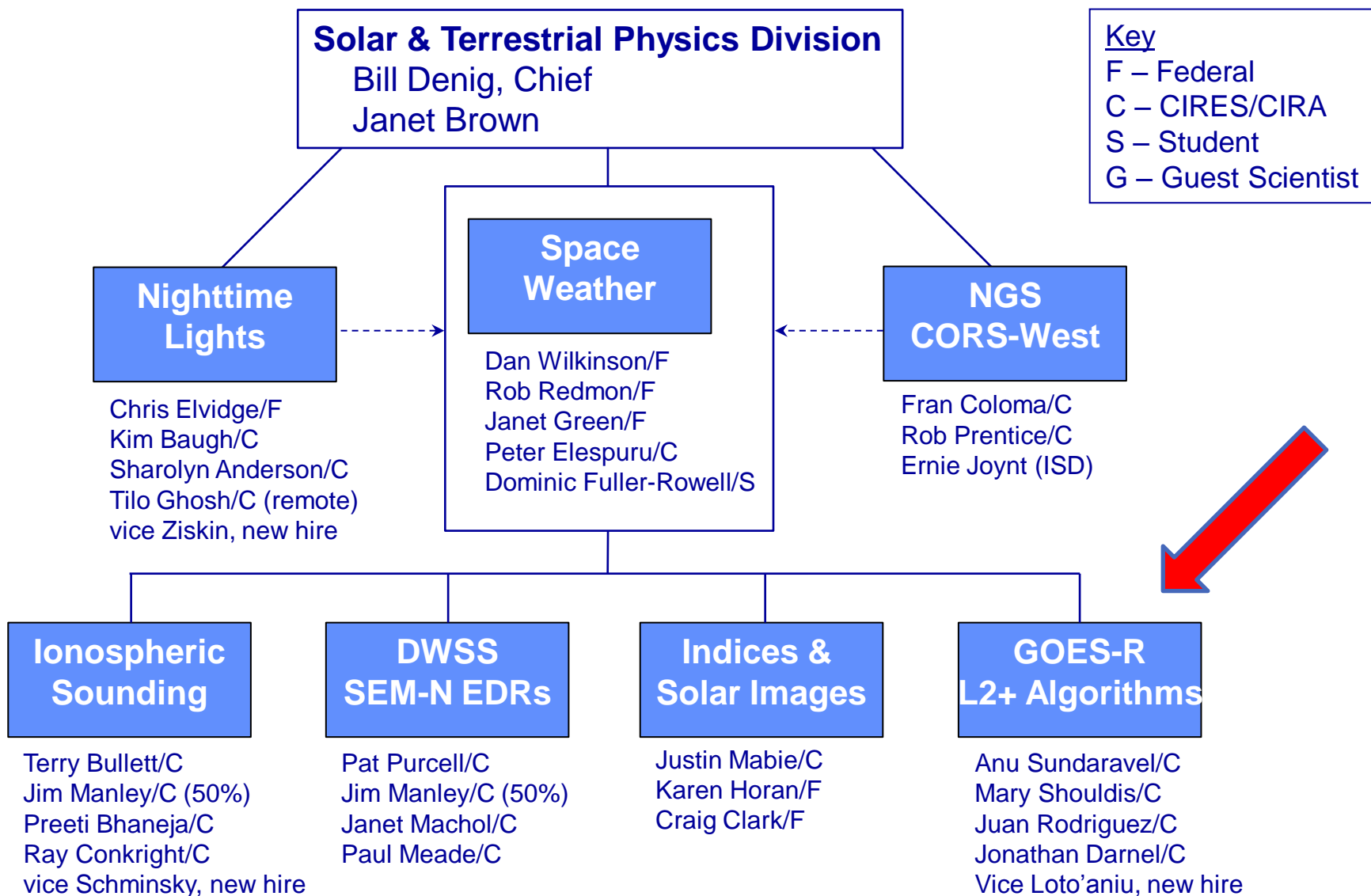
- Scientific Data Stewardship
- Cal/Val Observation Systems
- Post Launch Testing
- Algorithm Research
- Post-Event Analysis
- Instrument Science/Research
- Instrument Performance
- POES Processing

***NGDC works hand-in-hand with the NWS/SWPC and other NESDIS components to ensure full-spectrum coverage for NOAA's operational SWx mission***



# GOES-R Site Visit

## STP Division – Personnel





# GOES-R Site Visit

## GOES-R Space Weather Team



Core Team	Name	Organization	Functional Area
	Mary Shouldis	CIRES/NGDC	Management
	Juan Rodriguez	CIRES/NGDC	SEISS
	Alysha Reinard	CIRES/SWPC	EXIS
	Jonathan Darnel	CIRES/NGDC	SUVI
	<i>CIRES New Hire</i>	CIRES/NGDC	MAG
	Leslie Mayer	CIRES/SWPC	MAG/SEISS
	Jim Vickroy	CIRES/SWPC	SUVI
	Bill Denig	NGDC	Federal Oversight
	Janet Green	NGDC	SEISS Advisory
	Rob Redmon	NGDC	MAG Advisory
	Dan Wilkinson	NGDC	Archive
	<i>Federal New Hire (pending)</i>	NGDC	SUVI Advisory
	Steven Hill	SWPC	SUVI Advisory
	Terry Onsager	SWPC	SEISS Advisory
	Rodney Viereck	SWPC	XRS/EUVS Advisory
	Howard Singer	SWPC	MAG Advisory
	Christopher Balch	SWPC	Lead Forecaster



# GOES-R Site Visit

## Space Weather L2+ Product Overview



### Product Set 1 Complete

XRS.04: One-minute averages for both long and short channels  
EUVS.03: One-minute averages of broad spectral bands  
SEISS.16: One-minute averages - all MPS channels  
SEISS.17: Five-minute averages - all MPS and SGPS channels  
SEISS.18: Convert differential proton flux values to integral flux values  
MAG.07: MAG data in alternate geophysical coordinate systems  
MAG.08: One-minute averages  
MAG.09: Comparison to quiet fields  
SUVI.07: Composite (wide dynamic range) images  
SUVI.09 and .10: Fixed and running difference images

### Product Set 2 Complete

XRS.05: Calculate the ratio of the short over long channels  
XRS.09: Daily Background  
XRS.07: Event Detection with one-minute data  
EUVS.03D: Daily averages of broad spectral bands  
EUVS.04: Event Detection  
SEISS.19: Density & temperature moments & level of spacecraft charging  
MAG.10: Magnetopause crossing detection  
SUVI.12: Coronal Hole Images  
SUVI.19: Thematic Map

Legacy Product  
New Product

### Product Set 3 *In Process*

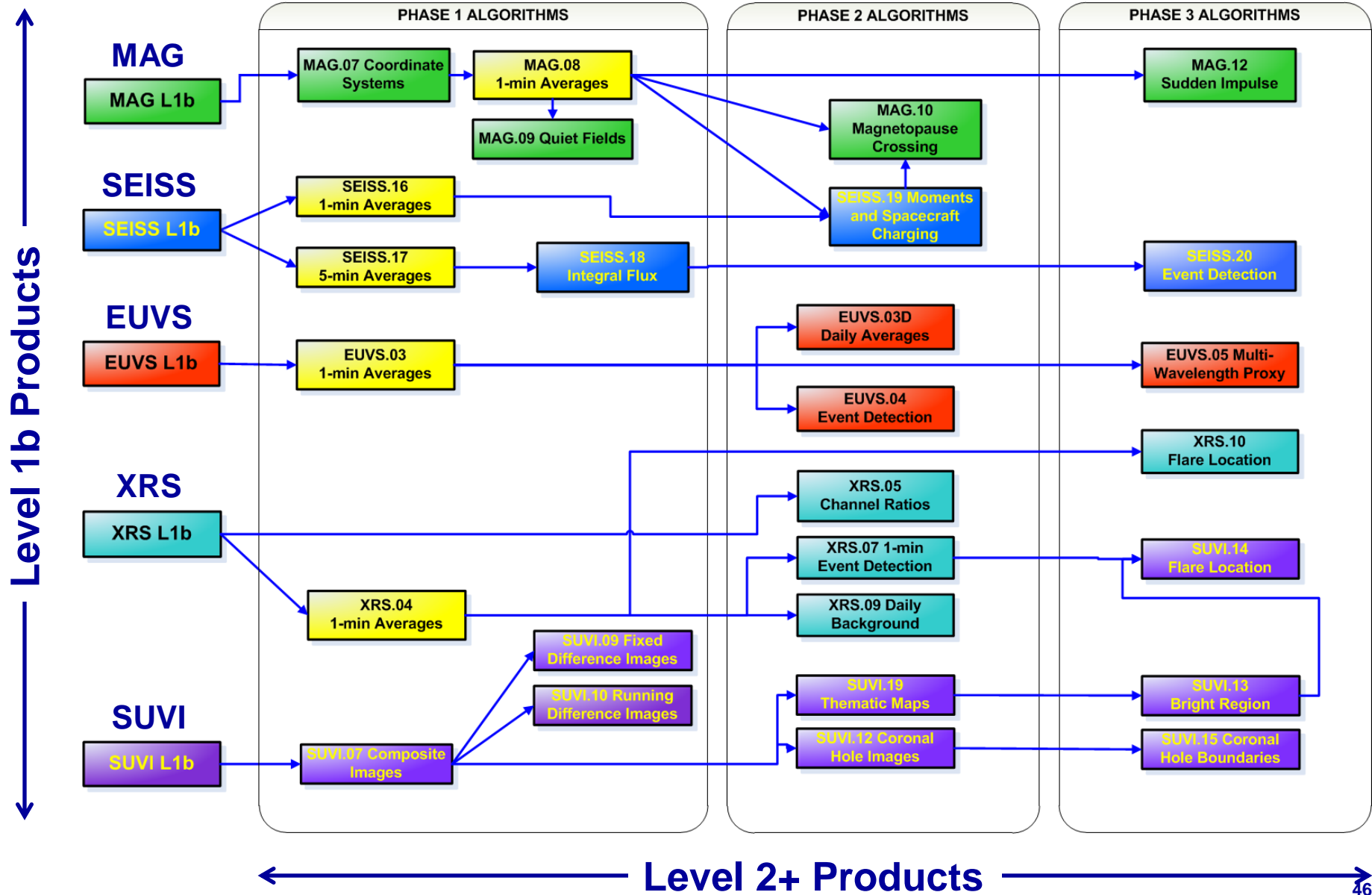
XRS.10: Flare Location  
EUVS.05: Multi-wavelength proxy  
SEISS.20: Event detection based on flux values  
MAG.12: Sudden Impulse (SI) detection  
SUVI.13: Bright Region Data  
SUVI.14: Flare Location (XFL) reports  
SUVI.15: Coronal Hole Boundaries

- 26 Level 2+ Space Weather Products in three product sets
- 18 are operational legacy, 8 are new or have experimental heritage



# GOES-R Site Visit

## Product L1b/L2+ Interdependencies





# GOES-R Site Visit

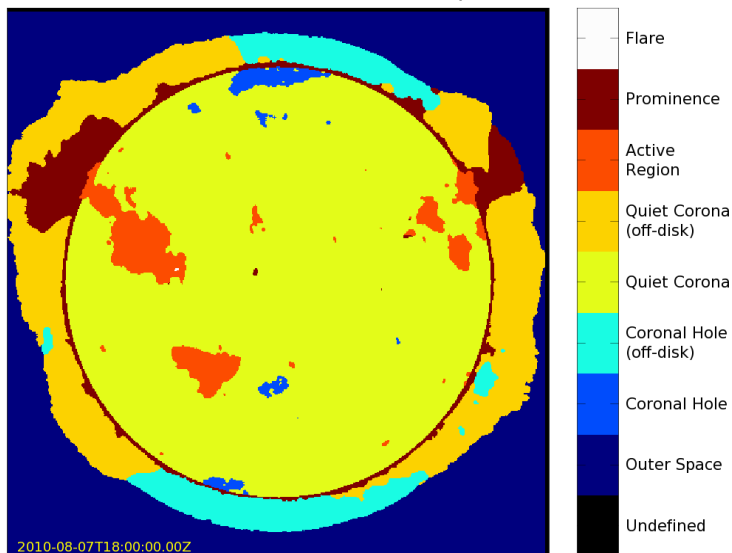
## Early Uses of GOES-S L2+ Products



### SUVI.19

Thematic maps will be used to identify distinct solar regions including flares, prominences, coronal holes, active regions and corona. This technology will be used for the GOES-R proving ground.

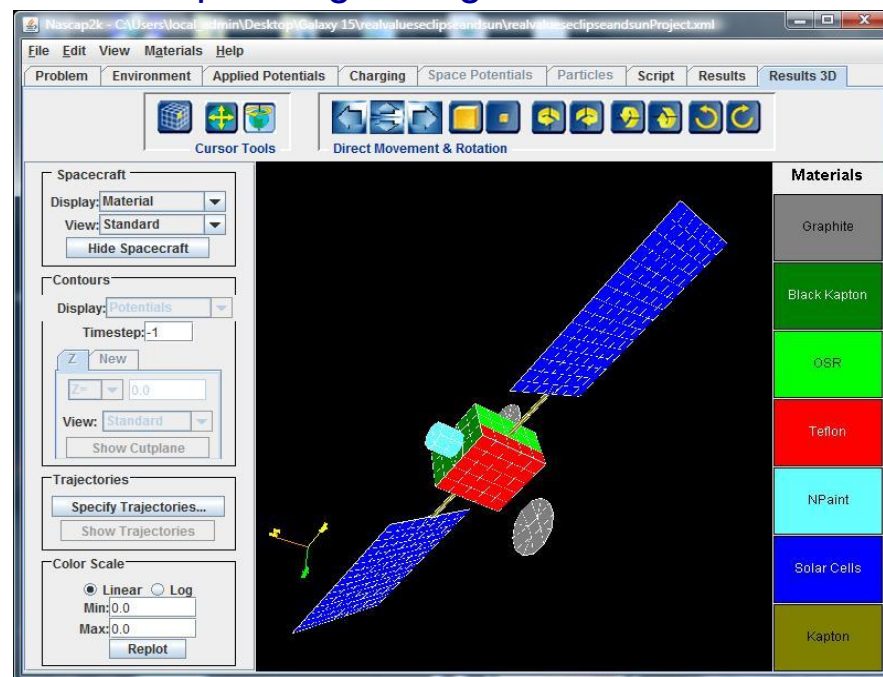
Solar Corona MAP Thematic Map



Proxy data from the NASA Solar Dynamics Observatory's Atmospheric Imaging Assembly.

### SEISS.19

Determination of the local environment used to model spacecraft potentials and assess Electro-Static Discharge (ESD) risks. Image below is the NASCAP run of Galaxy-15 for the 05-April-10 geomagnetic storm<sup>1</sup>.



\*\*\*\*Algorithm now in production within NGDC\*\*\*\*



# GOES-R Site Visit

## Discussion Topics



### Primary Motivation & Meeting Rationale

- Define a R2O Path Forward for the GOES-R L2+ SWx algorithms

### Other topics (follow-up discussion topics for Steve & Greg):

- Considering the SUVI point spread function as a future RRR activity
- Increased role for NGDC in the cal/val of the SWx sensors
- Ensuring the availability of calibrated instrument housekeeping data in near real time (GAS) for use during PLT, cal/val and operations and in CLASS for retrospective analyses
- Assigning responsibility for analysis of in-flight calibrations of MAG and SEISS (including tool development)
- Identifying the process for developing and incorporating changes to L1b algorithms following PLT and on-orbit cal/val
- Specifying requirements for coordinate systems of MAG L1b data
- Adding SWx L2+ products to list of [GOES-R Future Capabilities](#)



# **OUTLINE**

## **Solar & Terrestrial Physics Division**



**STP Program Overview**

**Milestones & Performance Measures**

**Personnel Activities**

**Accomplishments & Updates**

**Special Interest Items**

**Greg Mandt Visit**

**➔ Issues & Summary**



# Issues & Summary

## STP FY11 Publications – Page 1 of 2



- Alken, P., S. Maus, A.D. Richmond and A.I. Maute (2011), The Ionospheric Gravity and Diamagnetic Current Systems, *J. Geophys. Res.*, doi:10.1029/2011JA017126, in press.
- Araujo-Pradere, E.A., **R.J. Redmon**, M. Fedrizzi, R. Viereck, and T.J. Fuller-Rowell, (2011), Some Characteristics of the Ionospheric Behavior During Solar Cycle 23/24 Minimum, *Solar Physics* <http://www.springerlink.com/content/m65x78114p285346/>.
- Aubrecht, C., M. Stojan-Dolar, A. de Sherbinin, M. Jaiteh, T. Longcore, and **C. Elvidge** (2010), "Lighting Governance for Protected Areas and Beyond – Identifying the Urgent Need for Sustainable Management of Artificial Light at Night", *Earthzine*, IEEE, 20 December 2010.
- Clilverd, M.A., C.J. Rodger, R.J. Gamble, T. Ulich, T. Raita, A. Seppälä, **J.C. Green**, N.R. Thomson, J.-A. Sauvaud, and M. Parrot (2010), Ground-based Estimates of Outer Radiation Belt Energetic Electron Precipitation Fluxes into the Atmosphere, *J. Geophys. Res.*, **115**, A12304, doi:10.1029/2010JA015638.
- Denig, W.**, D. Cooke, and D. Ferguson (2010), Spacecraft Charging and Mitigation, *Space Weather*, **8**, S10007, doi:10.1029/2010SW000632.
- Eakin, C.M., C.J. Nim, R.E. Brainard, C. Aubrecht, **C.D. Elvidge**, K. Gledhill, F. Muller-Karger, P.J. Mumby, W.J. Skirving, A.E. Strong, M. Wang, S. Weeks, F. Wentz, and **D.C. Ziskin** (2010), "Monitoring Coral Reefs from Space", *Oceanography*, **23**, pp 118-133.
- Earle, G.D., **P. Bhaneja**, P.A. Roddy, C.M. Swenson, A. Barjatya, R.L. Bishop, **T.W. Bullett**, G. Crowley, **R. Redmon**, K. Groves, R. Cosgrove and S.L. Vadas (2010), A Comprehensive Rocket and Radar Study of Midlatitude Spread *F*, *J. Geophys. Res.*, **115**, A12339, doi:10.1029/2010JA015503.
- Eccles, V., D.D. Rice, J.J. Sojka, C.E. Valladares, **T. Bullett** and J.L. Chau (2011), Lunar Atmospheric Tidal Effects in the Plasma Drifts Observed by the Low-Latitude Ionospheric Sensor Network, *J. Geophys. Res.*, **116**, A07309, doi:10.1029/2010JA016282.
- Elvidge, C.D.**, **K.E. Baugh**, P.C. Sutton, B. Bhaduri, B.T. Tuttle, **T. Ghosh**, **D. Ziskin** and **E.H. Erwin** (2010), "Who's In The Dark: Satellite Based Estimates Of Electrification Rates", *Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment*, Ed. Xiaojun Yang, Wiley-Blackwell, Chichester, UK, p. 211-224.
- Ferguson, D.C., **W.F. Denig** and J.V. Rodriguez (2011), Plasma Conditions During the Galaxy 15 Anomaly and the Possibility of ESD from Subsurface Charging, Proceedings of the 49th AIAA Aerospace Sciences Meeting in Orlando, Florida, 04-07 January 2011.
- Ghosh, T.**, R. Powell, **C.D. Elvidge**, **K.E. Baugh**, P.C. Sutton and **S. Anderson** (2010), "Shedding Light on the Global Distribution of Economic Activity", *The Open Geography Journal*, **3**, 147-160, doi: 10.2174/1874923201003010147.
- Ghosh, T.**, **C.D. Elvidge**, P.C. Sutton, **K.E. Baugh**, **D. Ziskin** and B.T. Tuttle (2010), "Creating a Global Grid of Distributed Fossil Fuel CO<sub>2</sub> Emissions from Nighttime Satellite Imagery", *Energies*, **3**(12), 1895-1913.
- Meredith, N.P., R.B. Horne, M.M. Lam, M.H. Denton, J.E. Borovsky and **J.C. Green** (2011), Energetic Electron Precipitation During High-Speed Solar Wind Stream Driven Storms, *J. Geophys. Res.*, **116**, A05223, doi:10.1029/2010JA016293.



# Issues & Summary

## STP FY11 Publications – Page 2 of 2



- Millan, R.M., K.B. Yando, **J.C. Green** and A. OY. Ukhorskiy (2010), Spatial Distribution of Relativistic Electron Precipitation During a Radiation Belt Depletion Event, *Geophys. Res. Lett.*, 37, L20103, doi:10.1029/2010GL044919.
- Newell, P. T., T. Sotirelis, K. Liou, A. R. Lee, S. Wing, **J. Green**, and **R. Redmon** (2010), Predictive Ability of Four Auroral Precipitation Models as Evaluated using Polar UVI Global Images, *Space Weather*, 8, S12004, doi:10.1029/2010SW000604.
- Redmon, R. J.**, D. Anderson, R. Caton, and **T. Bullett** (2010), A Forecasting Ionospheric Real-time Scintillation Tool (FIRST), *Space Weather*, 8, S12003, doi:10.1029/2010SW000582.
- Redmon, R. J.**, W. K. Peterson, L. Andersson, E. A. Kihn, **W. F. Denig**, M. Hairston, and R. Coley (2010), Vertical Thermal O<sup>+</sup> Flows at 850 km in Dynamic Auroral Boundary Coordinates, *J. Geophys. Res.*, 115, A00J08, doi:10.1029/2010JA015589.
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- Small, C., **C.D. Elvidge**, D. Balk and M. Montgomery (2011), Spatial Scaling of Stable ILights, *Remote Sensing of the Environment*, 115, 269-280.
- Sutton, P.C., M.J. Taylor and **C.D. Elvidge** (2010), Using DMSP OLS Imagery to Characterize Urban Populations in Developed and Developing Countries, in "Remote Sensing of Urban and Suburban Areas", *Volume 10*, Part 2, Eds. Rashed, Tarek, Jürgens, Carsten, Springer, 329-348, doi: 10.1007/978-1-4020-4385-7\_17.
- Takahashi, K.I., R. Terakado, J. Nakamura, Y. Adachi, **C.D. Elvidge** and Y. Matsuno (2010), In-use Stock Analysis Using Satellite Nighttime Light Observation Data, *Resources, Conservation and Recycling*, 55 (2), 196-200, doi:10.1016/j.resconrec.2010.09.008.
- Zhao, N., **T. Ghosh**, N.A. Currit and **C.D. Elvidge** (2011), Relationships Between Satellite Observed Lit Area and Water Footprints, *Water Resource Management*, 11 March 2011, doi 10.1007/s11269-011-9804-3.
- Zabotin, N. and **T. Bullett** (2011), Spatial Effects of HF Multiple Scattering in the Ionosphere: Experimental Observations, *Radio Sci.*, 46, RS4009, doi:10.1029/2011RS004645.



# Issues & Summary

## Solar & Terrestrial Physics Division



- ✓ **GOES-R L2+ SWx algorithms (3QFY11) – active (GOES-R meeting)**
- ✓ Loss of key personnel has a severe mission impact (3QFY10) - *NLAI*
- **Satellite processing transition from SWPC (4QFY09) – *DOA/NLAI***
- ✓ Continuity of solar data services (1QFY09) – *NLAI*
- ✓ *Refocus of NWS/SWPC Objectives (2QFY08) – NLAI*
- **NightSat Mission Concept (1QFY08) – active (proposal submitted)**
- ✓ *NGS Aerial Photography (1QFY08) – NLAI*

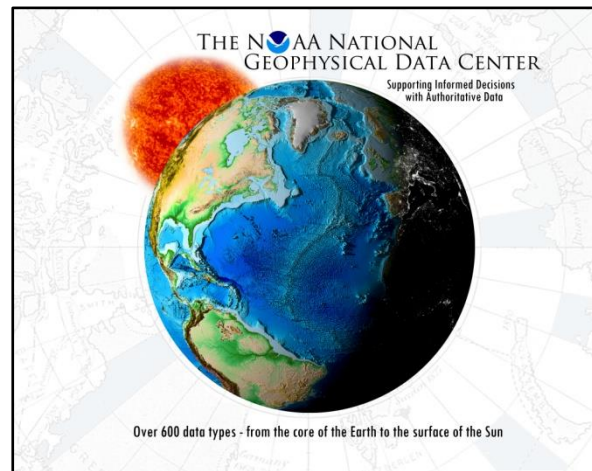
### Metrics (FY11)

Papers Published: 23

Presentations: 56

### Supporting Materials

STP FY11 Presentation List (Backup slides)





# QUESTIONS?



# Issues & Summary

## STP FY11 Presentations – Pg 1 of 4



### CIRES Innovative Research Program, 17 November 2010, Boulder, CO

- Passive Radio Imaging in Water Resource Management, Glaciology and Space Weather Monitoring (Poster), N.A. Zabotin, G. Godin and **T.W. Bullett**

### Space Research Institute of the Russian Academy of Science, 10 November 2010, Moscow, Russia

- Web Service Access to NOAA/NGDC Space Weather Data (Oral), **P. Elespuru**
- Overview of the Colorado Student Space Weather Experiment (CSSWE) CubeSat Satellite (Oral), **P. Elespuru**

### International School for Atmospheric Radars, 15-26 November 2010, Chung-Li, Taiwan

- High Frequency Radars and Ionospheric Sounding (Invited Lecture), **T. Bullett**

### US-India US-India Network Enabled Research Collaboration Workshop, 05-07 December 2010, New Delhi, India.

- Potential for Expanded Exchange of Earth Observation Satellite Data for Climate, Weather and Environmental Studies (Oral), **C.E. Elvidge**

### Indian Space Research Organization (ISRO) National Remote Sensing Centre, 09 December 2010, Hyderabad, India

- Nighttime Lights of India: 1992-2010 (Oral), **C.E. Elvidge**

### Indian Space Research Organization (ISRO) Space Science Institute, 10 December 2010, Trivandrum, India

- Nighttime Lights of India: 1992-2010 (Oral), **C.E. Elvidge**

### Loreta College, 13 December 2010, Kolkata, India

- Nighttime Lights of India: 1992-2010 (Oral), **C.E. Elvidge**

### Presidency College, 13 December 2010, Kolkata, India

- Nighttime Lights of India: 1992-2010 (Oral), **C.E. Elvidge**

### American Geophysical Union (AGU) Fall Meeting, 13-17 December 2010, San Francisco, CA

- A Global View of O+ Upwelling and Outflow Rates Between DMSP and POLAR (Poster), SM33B-1894, **R.J. Redmon**, W.K. Peterson, L. Andersson, E.A. Kihn and **W.F. Denig**
- A Prototype Web-based system for GOES-R Space Weather Data (Poster), IN43A-1374, **A. Sundaravel** and **D.C. Wilkinson**
- Auroral Resources: Dataset Access and Interactive Visualization (Poster), IN43A-1395, **P. Elespuru**, **R.J. Redmon**, E.A. Kihn, M. Zhizhin and D. Medvedev
- Current Operations and Future Plans for Forecasting Products Based on NOAA LEO Satellite Observations (Oral), SM54A02, **J.C. Green**, **J.L. Machol**, **W.F. Denig**, R.A. Viereck, R. Rutledge and J. Kunches



# Issues & Summary

## STP FY11 Presentations – Pg 2 of 4



### American Geophysical Union (AGU) Fall Meeting, 13-17 December 2010, San Francisco, CA – Continued

- Enhancing Natural Hazards Data with Photographs (Poster), IN33B1304, H.L. McCullough, J.D. Varner and **R.J. Redmon**
- Gas Flaring Volume Estimates with Multiple Satellite Observations (Poster), A43D-0271, **D.C. Ziskin, C. Elvidge, K. Baugh, T. Ghosh** and F.C. Hsu
- Modeling the Gravity and Magnetic Pressure Driven Currents in the F-region Ionosphere (Poster), SA51B-1631, **P. Alken**, S. Maus, A. Richmond and A. Maute
- Multipoint Observations of the Large Substorm Associated with the Galaxy 15 Anomaly (Oral), SM22B-05, H.J. Singer, P.T. Loto'aniu, J.C. Green, J.V. Rodriguez, B.J. Anderson, J.J. Love, V. Angelopoulos, D.N. Baker, M.G. Connors, **W.F. Denig**, E.F. Donovan, O. LeContel, T.G. Onsager, T. Nagatsuma, A. Runov and E.L. Spanswick
- New Operational Algorithms for Particle Data from Low-Altitude Polar-Orbiting Satellites (Poster), SM51A-1766, **J.L. Machol, J.C. Green, J.V. Rodriguez**, T.G. Onsager and **W.F. Denig**
- New Products from New Satellites - GOES NOP Satellite Series Space Weather Data and Their Archive for Retrospective Access (Poster), SM51A-1767, **D.C. Wilkinson**
- NGDC Geomagnetic Observatory Holdings (Poster), GP11A-0749, **J.J. Mabee**
- Space Weather Conditions at the Time of the Galaxy 15 Spacecraft Anomaly (Oral, Invited), SH31D03, **W.F. Denig, J.C. Green, D.C. Wilkinson, J.V. Rodriguez**, H.J. Singer, P.T. Loto'aniu, D.A. Biesecker and W. Murtagh
- The Future of Space Environment Monitoring in Low Earth Orbit (Poster), IN31A1271, **W.F. Denig**, M. Bonadonna, K.D. Scro and **J.C. Green**

### 49th American Institute of Aeronautics and Astronautics (AIAA) Aerospace Sciences Meeting, 04-07 January 2011, Orlando, FL

- Plasma Conditions During the Galaxy 15 Anomaly and the Possibility of ESD from Subsurface Charging (Oral), D.C. Ferguson, **W.F. Denig** and **J.V. Rodriguez**

### National Radio Science Meeting, 05-08 January 2011, Boulder, CO

- New Ionosonde Observations from Puerto Rico (Oral), **T.W. Bullett**
- Spatial Effects of HF Multiple Scatter in the Ionosphere: Experimental Observations (Oral), N.A. Zabolotin and **T.W. Bullett**
- Equatorial Dynamics and Scintillation (Oral), **R.J. Redmon**, D. Anderson, R. Caton, and **T. Bullett**
- Comparison of Statistical Analysis of Midlatitude Spread F for Various Sites Including Wallops Island (Virginia), Boulder (Colorado), Vandenberg AFB (California) and Dyess AFB (Texas) (Oral), **P. Bhaneja** and **T.W. Bullett**

### Geospatial World Forum, Hyderabad, India, January 18-21, 2011

- Using the Nighttime Satellite Imagery to Create a Global Grid of Distributed Fossil Fuel CO<sub>2</sub> Emissions (Poster), **T. Ghosh, C.D. Elvidge**, P.C. Sutton, **K.E. Baugh**, B. T. Tuttle, and **D. Ziskin**



# Issues & Summary

## STP FY11 Presentations – Pg 3 of 4



### American Meteorological Society (AMS) Annual Meeting, 23-27 Jan 2011, Seattle, WA

- Space Weather From the SEM-N Sensor Suite for Operational Use (Oral), **W. Denig, P. Purcell** and C.D. Reimer

### South China Sea Fisheries Research Institute, 24 Jan 2011, Guangzhou, China

- A Nineteen Year Record of Lit Fishing Boat Activity (Oral), **C.D. Elvidge, K.E. Baugh, T. Ghosh, S. Anderson** and **D. Ziskin**

### Artificial Intelligence in the Earth's Magnetic Field Study, 26-28 January 2011, Uglich, Yaroslavl Region, Russia

- Geomagnetic Data in the World Data Center Archives (Oral, Invited), **J. Mabe**

### NRC Heliophysics Decadal Survey "Research to Operations/Operations to Research Town Hall", 7-8 February 2011, Irvine, CA

- On the Utility of Operational Satellite Data to Solar & Space Physics Research (Oral), **W.F. Denig**

### The Relationship Between Auroral Phenomenology and Magnetospheric Processes, 27 February - 04 March 2011, Fairbanks, AK

- A Global View of O+ Upward Flows and Outflow Rates Between DMSP and POLAR (Oral), **R. Redmon, W. Peterson, L. Andersson** and **W. Denig**

### Boulder Solar Day, 18 March 2011, Boulder, CO

- Space Environmental Conditions at the Time of the Galaxy 15 Anomaly (Oral), **W.F. Denig, J.C. Green,** and **J.V. Rodriguez**

### 31st Asia Pacific Advanced Network Meeting, 21-25 Feb 2011, Hong Kong, China

- Examination of Gas Flares in THEOS Satellite Data (Oral), **C.D. Elvidge, K.E. Baugh, T. Ghosh, S. Anderson** and **D. Ziskin**
- Satellite Observed Nighttime Lights of China (Oral), **C.D. Elvidge, K.E. Baugh, T. Ghosh, S. Anderson** and **D. Ziskin**

### National Air and Space Information Center (NASIC), 14 Mar 2011, Wright-Patterson AFB, OH

- Operational Linescan System (OLS) Products Prepared by the NGDC Earth Observations Group (Oral), **K.E. Baugh**

### Nightsat Proposal Workshop, 22 Mar 2011, NASA Ames Research Center, Moffett Field, CA

- Nightsat Design Considerations (Oral), **C.D. Elvidge, K.E. Baugh, T. Ghosh, S. Anderson** and **D. Ziskin**

### 1st Joint THEMIS-TWINS Science Workshop, March 21-25, 2011, Los Angeles, CA

- An Introduction to the New GOES 13-15 Magnetospheric Electron and Proton Data (Tutorial), **J.V. Rodriguez, T.G. Onsager** and **J.C. Green**

### Global Vulcan Project Kickoff Meeting, 30 Mar 2011, Arizona State University, Tempe, AZ

- DMSP Nighttime Lights (Oral), **C.D. Elvidge, K.E. Baugh, T. Ghosh, S. Anderson** and **D. Ziskin**



# Issues & Summary

## STP FY11 Presentations – Pg 4 of 4



### Space Weather Workshop, 24-27 Apr 2011, Boulder, CO

- Space Weather Conditions at the Time of the Galaxy 15 Spacecraft Anomaly (Invited), **W. Denig**
- AuroralResources Toolkit (ART) (Poster), **R.J. Redmon, P. Elespuru**, E.A. Kihn, M. Zhizhin, D. Medvedev, A. Godunov
- Improving Access to Space Weather Data via Workflows and Web Services (Poster), **A.Sundaravel**, E.A.Kihn and **P.Elespuru**
- Historical Space Weather Forecasts and Synoptic Drawings Now Available Online (Poster), **K.E. Horan**, D. Biesecker and L. Combs
- Evaluation of the Ovation Prime Model for Use for Visual Auroral Forecasts (Poster), **J. Machol, J. Green, R. Redmon**, R. Viereck and P. Newell

### Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR)/Geospace Environment Modeling (GEM) Joint Workshop, June 26 – July 1, 2011, Santa Fe, NM

- The Importance of Field Line History in Ion Outflow (Poster), **R.J. Redmon**, W.K. Peterson, L. Andersson, P. Richards and **W.F. Denig**
- Auroral Resources Toolkit (ART) (Poster), **W.F. Denig, R.J. Redmon, P. Elespuru**, E.A. Kihn, M. Zhizhin, D. Medvedev and A. Godunov
- A Tutorial on Ion Outflow (Tutorial), **R.J. Redmon**
- Auroral Forms that Extend Equatorward from the Persistent Midday Aurora during Geomagnetically Quiet Periods (Poster), **J.V. Rodriguez**, H.C. Carlson and R.A. Heelis
- Modeling and Observations of the East-west Effect in Solar Energetic Particle Flux at Geosynchronous Orbit (Poster), **J.V. Rodriguez**, B.T. Kress and J.E. Mazur

### High Energy Particle Precipitation into the Atmosphere (HEPPA), 09-11 may 2011, Granada, Spain

- Measurements of Energetic Particles (Oral, Invited), **W.F. Denig**

### International Union of Geodesy and Geophysics (IUGG), 28 Jun – 07 Jul 2011, Melbourne, Australia

- Ground Systems Data in the World Data Center Archives (Oral), **J. Mabie**, A. Soloviev, D. Herzog and **W.F. Denig**

### 32nd Asia Pacific Advanced Network Meeting, 22-25 August, 2011, Dehli, India

- DMSP Nighttime Lights of India (Oral), **T. Ghosh** and **C. Elvidge**
- Telecommuting 11.5 Time Zones (Oral), **T. Ghosh** and **K. Baugh**
- Assessing Income Distribution at the District Level for India Using Nighttime Satellite Imagery (Oral) - M.Chaturvedi, **T. Ghosh** and L. Bhandari

### GOES-R Risk Reduction (GOES-R3) Annual Review, 21-23 Sep 2011, Huntsville, AL

- GOES-R Space Weather L2+ Algorithms (Oral), **W. Denig**



# GOES-R Space Weather



## Selected New Products – Under Development

### XRS-10: Flare Location

Purpose: Automate the location of solar flares using the XRS instrument to aid in evaluation of impacts on earth-based and satellite systems

Usage: SWPC solar flare forecast aid

Current Status: In research

### MAG-12: Sudden Impulse Detection

Purpose: Automate the detection of impulsive magnetospheric events and provide shock wave impacts

Usage: SWPC geomagnetic storm and variation specifications and forecasts

Current Status: On hold until scientist is hired

### SEISS.20: Event Detection

Purpose: Adapt current SEP Event Detection algorithm to SEISS SGPS protons, define enhanced event detection using new SEISS measurements with dosimeters (MPS-HI) and heavy ions, especially iron (EHIS)

Usage: SWPC proton event warnings and NGDC satellite anomaly assessments

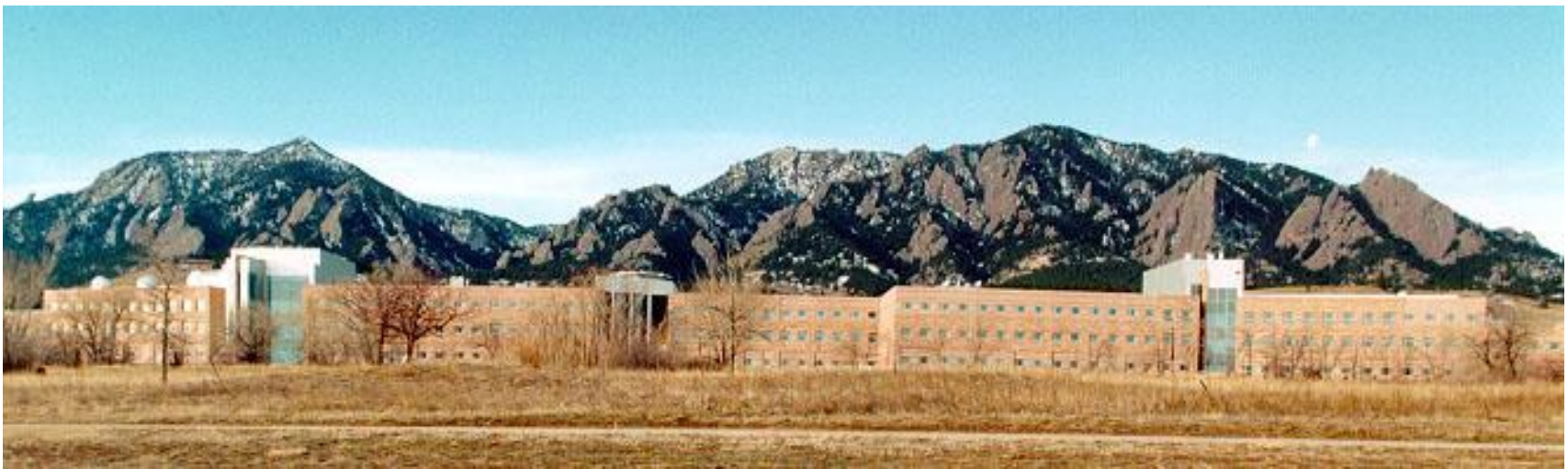
Current Status: In research

### SUVI.15: Coronal Hole Boundaries

Purpose: Automate the identification and location of coronal hole boundaries on solar images

Usage: SWPC coronal hole maps

Current Status: Scientist just hired



# ***GOES-R Program Office Visit***

**26 Oct 2011**



**William Denig**  
**Solar & Terrestrial Physics Division**  
**NOAA/NESDIS/NGDC**

**303 497-6323**

**[William.Denig@noaa.gov](mailto:William.Denig@noaa.gov)**